American Machinist

AUGUST 18, 1952

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Alco Tooling Assembles the M-47 Hybrid

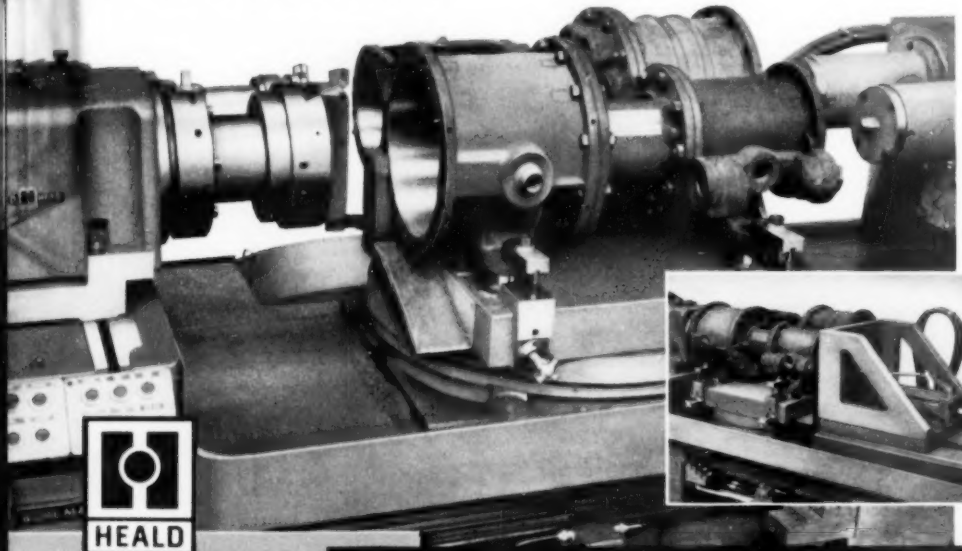
Here's How a Heald machine helps stop costly maintenance

Locomotive air brake compressor cylinders rebored in half the time — with better accuracy, too — on a new Heald Bore-Matic

The reboring of locomotive air brake compressors used to be a slow and tedious job — until a new Heald Model 524 Bore-Matic took over. Now the user, a large Railroad Service Shop, reports that production is doubled — roundness, bore size, alignment and finish so greatly improved that subsequent reborings will be less frequent and require a much lighter cut.

One reason for this increased speed and accuracy is the 180° indexing fixture and unique locating arrangement shown below. An hydraulic tailstock locator picks up locations on rear of part and tuble moves to left to locate front of part on two locators *mounted on the boringheads*. Part is then locked and clamped and boringhead locators are replaced by tooling. After front end is borized, work is hydraulically indexed 180° for borizing the rear cylinders.

Remember — when it comes to precision finishing, it pays to come to Heald.



Left: Front of Model 524 Bore-Matic with compressor cylinders clamped in place on hydraulic platen type 180° indexing fixture.

Below: End view of same machine showing hydraulically operated tailstock locater.

HEALD

Heald machines speed the nation's production

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OUR SEVENTY-FIFTH YEAR
1877-1952

American Machinist

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Clips and Quips

The M-47 . . . Almost a year ago, we saw American Locomotive Company making preparations to assemble the M-47 tank, tearing out the old steam-locomotive shop and rebuilding within the shell. Just recently, Ordnance authorized pictures of the completed plant, so we made a "picture tour." The result is our current Special Report—and our cover. The cover, painted by Howard Fogg for our use, shows an M-47 on the test road, built on the former Niskayuna golf course outside Schenectady. In right background is the arc-roofed modification building. For the whole story, see the Special Report.

Interview . . . As a special article in this issue, we have a report of the interview of Burnham Finney, editor, with Major-General Ford, Chief of Ordnance. Mr. Finney put 18 questions to the General on how Ordnance is meeting the present defense program. The questions, and the answers, make up an interesting four pages just ahead of the News—an appropriate location.

Tooling . . . Two more stories resulting from "Mike" Rowan's western swing-around appear in this issue. . . . One, from Peerless Pump, explains a special 2-position table for a multiple-spindle drill, which permits full utilization of the machine, as well as unloading outside the work area on a press for which a rotary table would be too large to be practical. A high degree of accuracy is attained. . . . The other story covers four tricky tooling setups for tough jobs at McCulloch Motors. All deal with producing the cutter for the power saw.

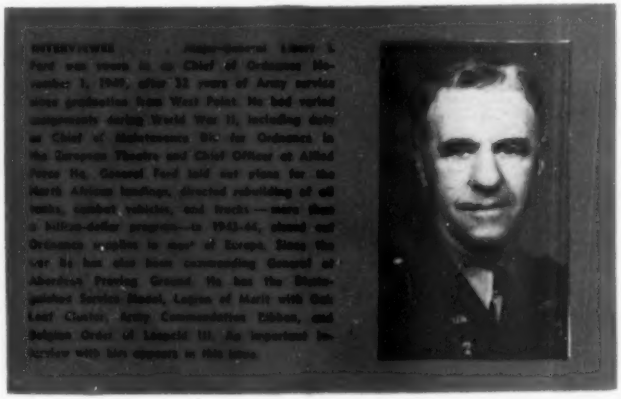
Air for Gaging . . . "Bill" (W T) Nystrom of Taft-Peirce showed us at the Tool Show last March an article he'd put together on air gaging. We liked his approach, so are publishing it as our lead article. It shows how high-speed production and ever-increasing demands for closer tolerances have brought in the method. Here are the principles of air-gage operation and some practical examples of the types of jobs such gages handle well.

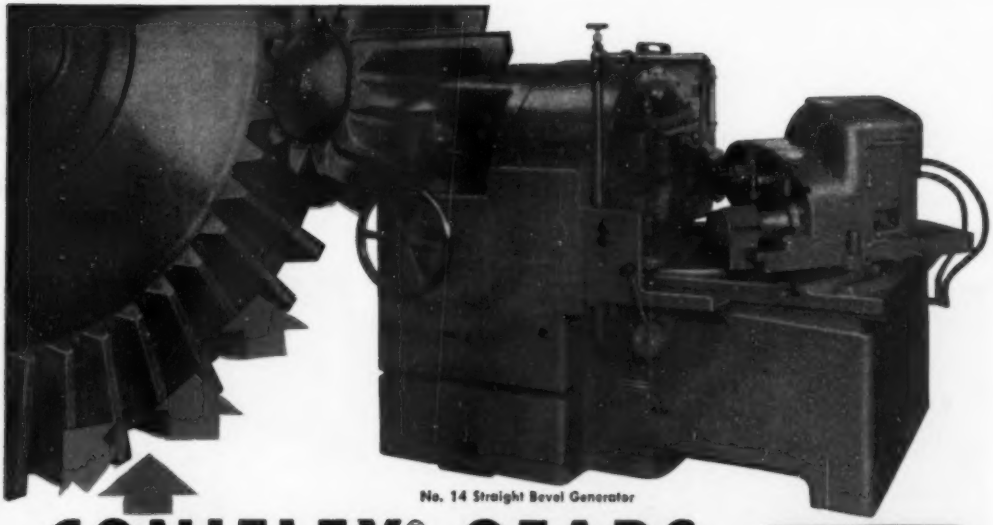
Cooler Quench . . . C L Ringquist of Trane Co describes methods of circulating and cooling oil, covering refrigerators, heat exchangers, evaporators, natural-water cooling, and pumps. His article is very timely because of current realization that cooling quenches and cutting fluids may be vital in attaining and retaining required present tolerances.

Dies . . . Latest in our NTDMA series is a die for work on heavy stock. The part is an automobile hinge box, made by piercing, blanking, bending, and U-forming. Very heavy steel sections are needed for the die components, yet they must be made to the precision of tools for much lighter stock, to permit use of coil stock with automatic feed. The die was made by Atlantic Mfg Co of Philadelphia. . . . A second article on dies, this time by Frank E Wilson, chief tool engineer for The Trane Co, describes a sliding base that positions fan-blade stock for a nibbling operation that cuts slots across the stock to various depths.

Sigma Again . . . Solar Aircraft of San Diego is using the Sigma process on three new jobs—mild steel, dissimilar metals, and gages as thin as 0.050 in.—with special equipment. Techniques for each application are outlined, with vital "whys." . . . A second article on welding, by W H Volkmar of J I Case Co, Rockford, Ill., describes automatic welding of eyebolts in an ingenious dial fixture.

Coming . . . Sept 1 *AM* will include an exceptional Special Report on press-tool safety, based on work by one of the larger insurance companies. Our lead article will describe some tricks in making powder-metal dies. There'll also be articles on making your own gun drills, on stretch forming, on sonic testing of honeycomb structures, on selecting a cutting fluid, and on forging edges of two large pieces simultaneously to balance press load.





No. 14 Straight Bevel Generator

CONIFLEX® GEARS

Cut on the Gleason No. 14 Straight Bevel Generator

No. 12 Generator Tool Sharpener

Here is the unit that is making Coniflex® gear history . . .

The Gleason No. 14 Straight Bevel Generator, completely universal for roughing and finishing of medium-size straight bevels in moderate quantities; can be used as the ideal machine for finishing only if production requirements warrant it. It also produces a localized tooth bearing (see arrows). Coniflex gears are smooth in operation, easy to assemble, and permit wider operating tolerances.

AUXILIARY EQUIPMENT

No. 13 Universal Gear Tester

BUILDERS OF BEVEL GEAR MACHINERY · GLEASON · FOR OVER EIGHTY-FIVE YEARS

The No. 12 Generator Tool Sharpener (shown above at right) provides accurate and smooth surface finish and long life for the cutting tools used on the Straight Bevel Generator.

The No. 13 Universal Gear Tester (above) assures not only uniform production but simplifies final assembly by pre-establishing the best running position of the gears.

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Increasing the job

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CINCINNATI No. 2MI Plain Milling Machine, equipped with Motor Driven Universal Milling Overarm Attachment. A 36-page catalog, No. M-1662-2, gives you complete details of CINCINNATI Nos. 2ML and 2MI Milling Machines. Write for a copy.

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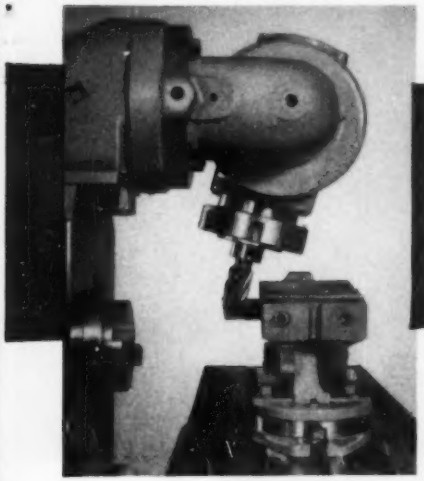
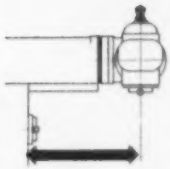
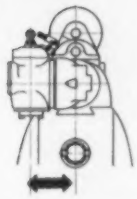
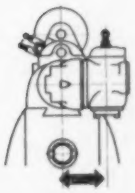
possibilities

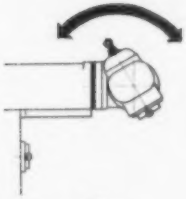
Overarm Attachment











How many times have you needed a little extra range or extra versatility for a milling setup? Just think how much it would have saved! You can get all the extra range and versatility you will need on your CINCINNATI knee-type milling machines by equipping them with Motor Driven Overarm Attachments. ¶ Consider the CINCINNATI No. 2MI, for example. Of itself, it offers a host of advantages: convenient and easy speed change with one lever . . . a similar feature at the front of the knee for feed changes . . . 16 spindle speeds, 60 to 1 ratio . . . 16 feeds, 120 to 1 ratio . . . unit construction for low-cost maintenance. To these advantages and many others, add the extra range and versatility offered by the Motor Driven Overarm Attachment, and you have a toolroom miller that can handle any job. ¶ A few examples of the ways in which these self-contained attachments increase the job possibilities of CINCINNATI Milling Machines are illustrated here. There are two sizes, 2 hp for 2ML, 2MI and Dial Types; 5 hp for Dial Types and High Power and Dual Power Dial Types. You may obtain more information by writing for publication No. M-1661-1.

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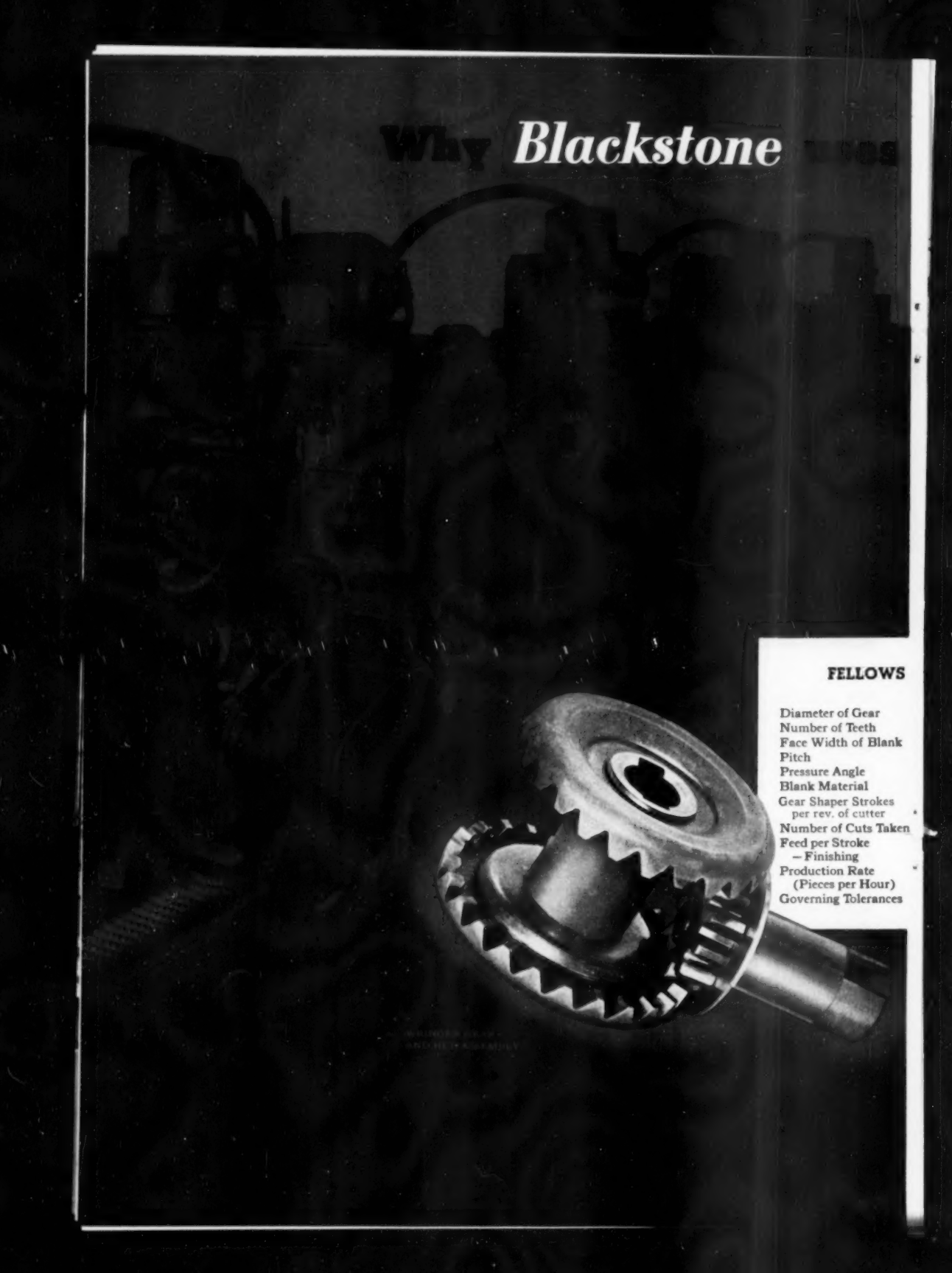
CINCINNATI 9, OHIO

ATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Why *Blackstone*

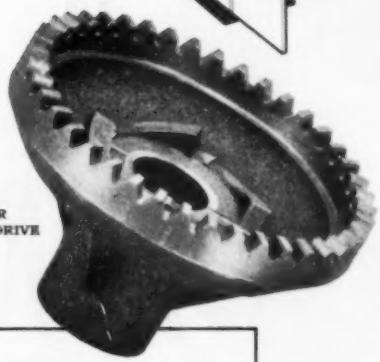


FELLOWS

Diameter of Gear
Number of Teeth
Face Width of Blank
Pitch
Pressure Angle
Blank Material
Gear Shaper Strokes per rev. of cutter
Number of Cuts Taken
Feed per Stroke — Finishing
Production Rate (Pieces per Hour)
Governing Tolerances

Fellows-cut Face Gears

IN ITS WASHER– IRONER PRODUCTS



IRONER ROLL DRIVE GEAR

Well made products that give long-time, trouble-free service to the user are sure to gain his continued satisfaction.

Blackstone builds just such products—and by so doing maintains its outstanding reputation for quality in the highly competitive electrical appliance field.

The use of face gears and pinions cut on Fellows Gear Shapers is one of the contributing factors to the success of Blackstone equipment. Production costs are low because these gears are easy and economical to produce and assemble. Quality of product is maintained because they transmit power quietly and efficiently. Long-time, trouble-free service is assured because they provide the smooth running action and the tooth strength needed to reduce the possibilities of breakdown to the minimum.

Contact the nearest Fellows office for details on the way you can take advantage of Fellows experience in furnishing up-to-date solutions to your gear manufacturing problems.

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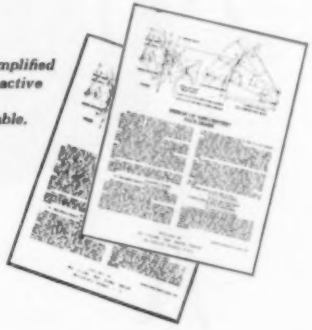
WRINGER GEAR	IRONER GEAR
2.813	2.837
25	42
3/16	5/32
10/12	16
20°	20°
C-1010 SH SAE	CAST IRON
1620	893
1	1
.002	.004
18	13
.002	.002

DATA SHEETS *describing a simplified procedure for determining the active face width for "on-center" and "off-center" face gears are available.*



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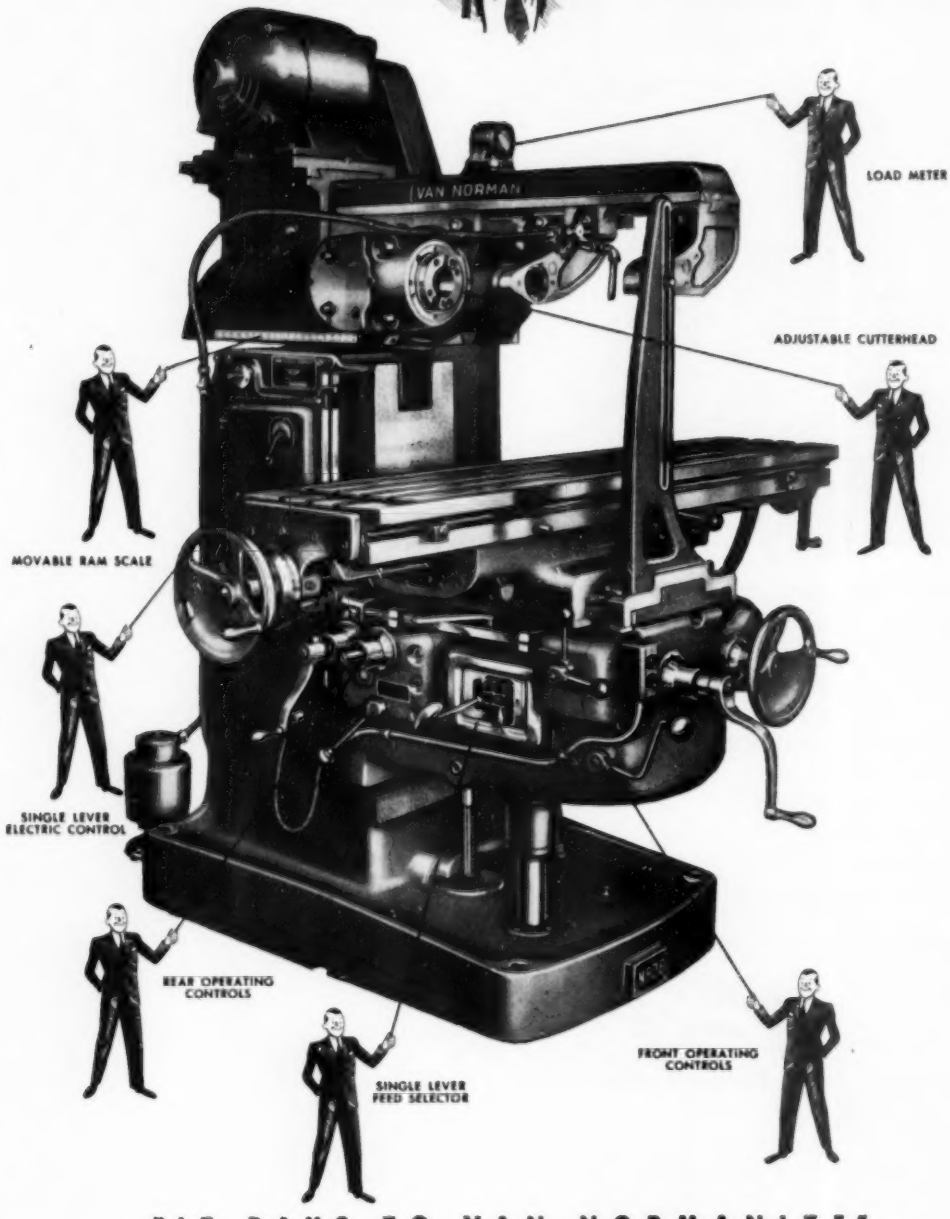
Look at the



"IT PAYS TO VAN NORMANIZE"

Production Advantages of the

VAN NORMAN

RAM TYPE MILLER

Regardless of the type of plant or the type of work, Van Norman Ram Type Millers can cut your milling costs and speed vital production. These versatile millers reduce idle machine time by as much as 50% because they enable the operator to perform conventional horizontal, vertical and angular milling on *one* machine. Look at what Van Norman Ram Type Millers can do for you —

Adjustable Cutterhead

By merely positioning the cutter head, the operator can perform horizontal, vertical or angular milling . . . the work of three single-purpose machines.

Increased Work Range

Movable ram plus the saddle crossfeed increase the work range and capacity of the miller . . . enable you to handle larger work pieces with ease.

Front and Rear Controls

Operating controls are located at front and rear for ease of operation. They eliminate back and forth operator motion . . . reduce operator fatigue.

Simplified Electric Control

Built-in electric controls simplify operation. Single lever selector controls spindle, feed, and coolant. Push button, on front of knee, starts and stops motors as pre-selected.

Load Meter

Built-in load meter indicates percent of load at which the cutter is operating. It enables the operator to operate miller at maximum efficiency . . . helps to prevent overloading of the miller motor.

Any way you look at it, the Van Norman No. 38 Ram Type Miller is your best buy for cutting costs, increasing production and accuracy.

Van Norman Ram Type Millers are available from 37" to 64" table lengths.

Write for complete information, today.

VAN NORMAN COMPANY

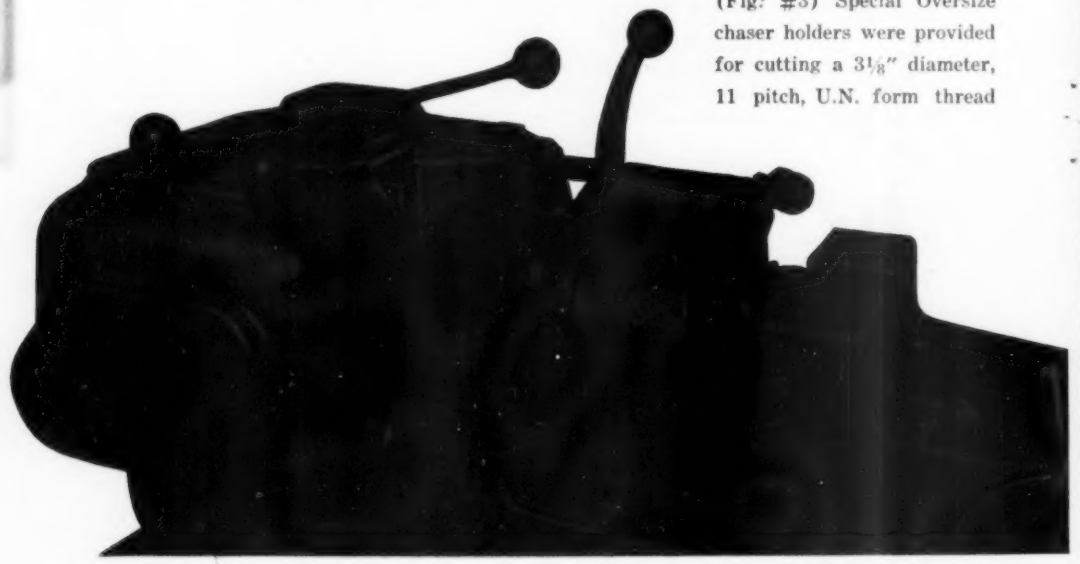
Springfield 7, Massachusetts

Landmaco Machine Threads Bell-shaped Gas Cylinder Collars

HARRISBURG Steel Corporation was interested in securing a more productive and economical means for threading stamped steel gas cylinder collars. Their threading problem arose mainly from the unusual bell shape of the work piece (Fig. #1), which made chucking difficult.

To solve their problem a 1½" LANDMACO Threading Machine was furnished equipped with a special work holding fixture. The fixture (Fig. #2) is bolted to both vise jaws and thus rendering the vise jaws immovable, achieving the desired results of a solid carriage front. The gas cylinder collars are slipped over the arbor of the fixture and abutted against the circular abutting plate. Three semi-round drive keys, which fit into pressed key ways in the bore of the work piece, prevent it from rotating on the arbor while under cut.

The die head supplied with this machine was a 1¼" Lanco Internal Trip Heat Treated Head. (Fig. #3) Special Oversize chaser holders were provided for cutting a 3⅛" diameter, 11 pitch, U.N. form thread



$1\frac{5}{16}$" in length. Internal tripping, by which the work piece opens the die head, assures the same thread length on each collar regardless of their variance in height. It also prevents any possibility of chaser breakage or die head damage by running the work piece too far into the die head while threading. The bell shaped design of the trip bar facilitates the alignment and holding of the collar on the work holding fixture while under cut.

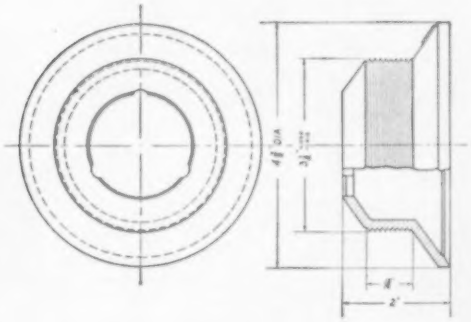


FIG. 1

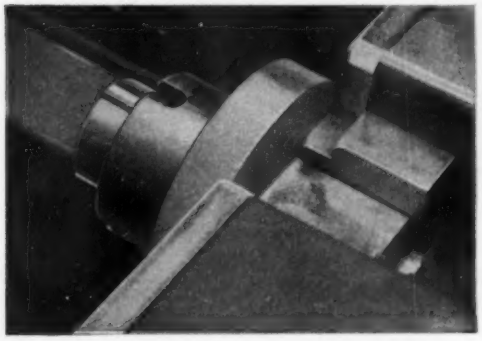


FIG. 2

Although special oversize chaser holders were furnished for this threading job, the chasers used in these holders were standard 11 pitch, U.N. form chasers. These chasers were supplied from our large chaser inventory and can be replaced immediately when the need arises. Usage of these chasers is not restricted to the diameter for which they were provided. They may be used for any diameter within the range of the die head by using proper chaser holders and if the thread form and pitch remain constant.

Now in operation at Harrisburg Steel, this machine has increased production and reduced threading cost on gas cylinder collars to their complete satisfaction. This is but one example of the many special work holding fixtures designed by Landis which enable the production of quality threads on unusual work pieces.

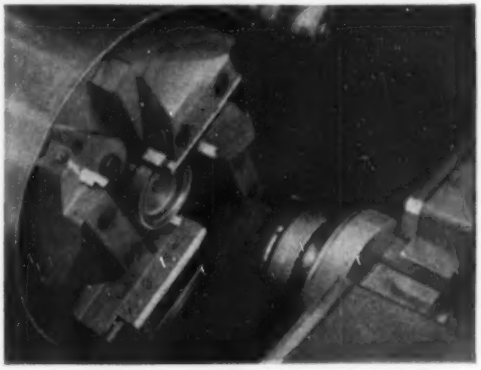


FIG. 3

LANDIS TRADE MARK REG. U.S. PAT. OFF.

THE LANDIS *Machine* COMPANY
WAYNESBORO-9 · PENNSYLVANIA · U.S.A.

Output per operator tripled

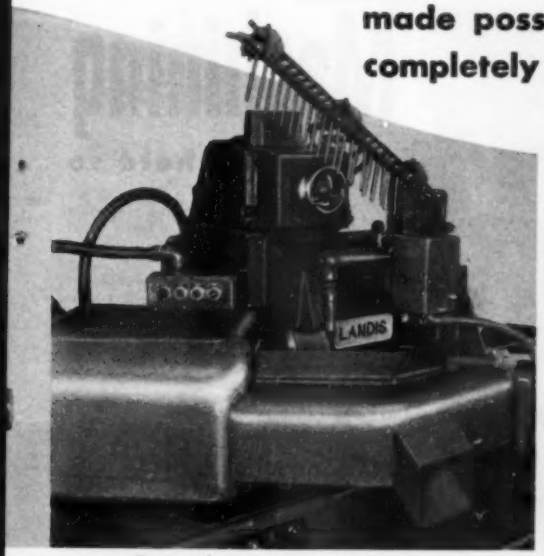
LANDIS Type H Automatic Valve
Face Grinding Machine

LANDIS

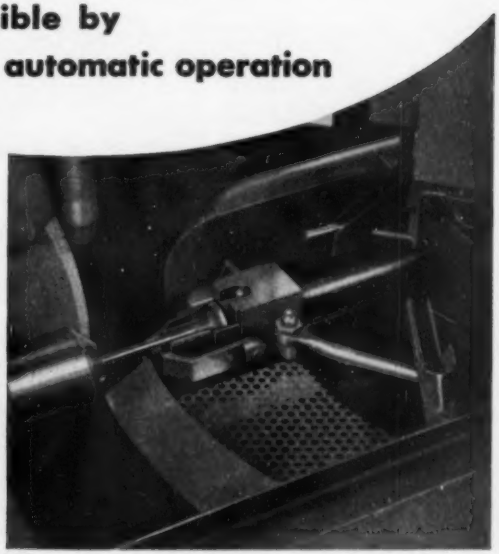
precision grinders

...grinding valve faces

made possible by completely automatic operation



GRAVITY FEED Valves switched off conveyor to an inclined track without handling by operator.



AUTOMATIC LOADING Power operated loader advances each valve and inserts it in revolving hydraulically operated collet chuck.

GRINDING Automatic cycle advances the wheel, grinds, times the spark-out period, retracts the wheel, releases the chuck. Wheel automatically dressed after a pre-selected number of valves are ground, and cycle is resumed.

AUTOMATIC UNLOADING At the end of the grinding cycle, the finished valve is ejected and, at the same time, a new valve is loaded.

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

Machining

tolerances held to

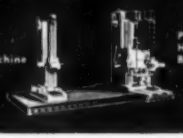
Here's how one manufacturer put heavy machining on a production basis—at a saving of nearly 75%!

Harnischfeger Corp., Milwaukee, used to machine heavy, bulky weldments on several different machines, each requiring a separate setup. Each increasing lost-time — adding labor costs.

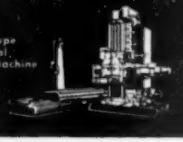
Now—in one setup—through the use of this big, new Giddings

GIDDINGS & LEWIS

Table Type Horizontal Boring Machine



Floor Type Horizontal Boring Machine



Planer Type Horizontal Boring Machine

Hypro Open-Side Planer

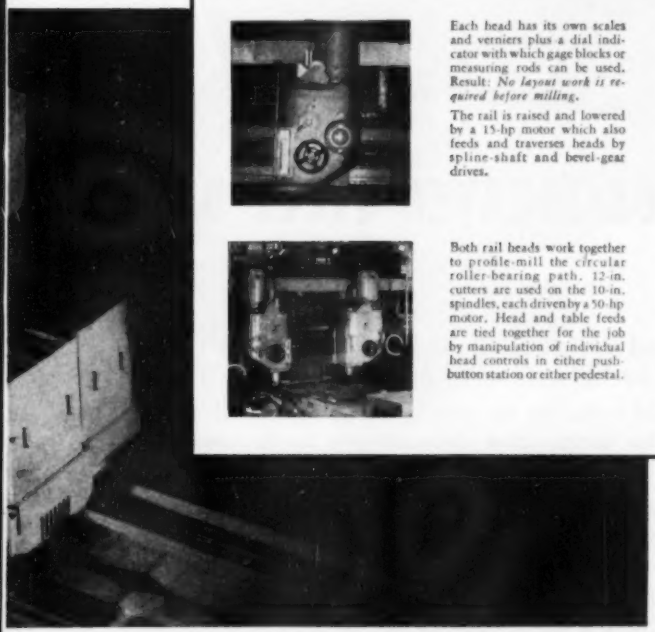
costs cut 75%

.002" on huge weldments

& Lewis planer-miller — capable of performing several operations in a single setup — all of this has changed. Today, Harnischfeger machines, on a strictly production basis, weldments as large as 12' x 9' x 24' — to tolerances within a .002". Overall machining costs reduced approximately 75%.

This is another example of the G&L 5-Point Job Analysis in action. Based on a comprehensive survey of Harnischfeger shop time and work requirements, the new G&L planer-miller checked on every count . . . offered immediate solution to curb ever-increasing costs.

Check the material at the right. See how it may pay you to get a G&L 5-Point Job Analysis.



Each head has its own scales and verniers plus a dial indicator with which gage blocks or measuring rods can be used. Result: *No layout work is required before milling.*

The rail is raised and lowered by a 15-hp motor which also feeds and traverses heads by spline-shaft and bevel-gear drives.

Both rail heads work together to profile-mill the circular roller-bearing path. 12-in. cutters are used on the 10-in. spindles, each driven by a 50-hp motor. Head and table feeds are tied together for the job by manipulation of individual head controls in either push-button station or either pedestal.

G&L 5-POINT JOB ANALYSIS

takes the guesswork out of machine tool buying . . works for you and with you to solve big or complex machining problems..increases production . . reduces machining costs

1 **COMPLETE STUDY OF YOUR JOB OR JOBS** — G&L Job Analysis Engineers, working with your engineers, analyze your requirements by: (1) number and size of parts to be produced, (2) number and kind of operations needed, (3) tolerances and finishes required.

2 **DETERMINE MOST EFFICIENT MACHINING METHOD** — Taking into consideration the individual machining requirements of the job, G&L Job Analysis Engineers choose the most efficient machining method. G&L engineers can give an unbiased opinion because G&L builds a complete line of sizes and types of planers, planer-millers, vertical boring and turning mills and horizontal boring, drilling and milling machines . . . plus a complete line of accessories and tooling for these machines.

3 **SELECT THE SIZE, KIND AND TYPE OF MACHINE**—The machining method now determined, G&L Job Analysis Engineers — using your production and work requirements — recommend the exact size, kind and type of machine that will do the job most efficiently.

4 **PLAN YOUR OPERATIONS** — After the selection of the most efficient machine to fit your needs, G&L Job Analysis Engineers plan a sequence of operations that will (1) minimize number of setups and setup time, (2) use modern cutting tools to best advantage, (3) take full advantage of the machine working ranges and capacities, (4) keep operator fatigue to a minimum.

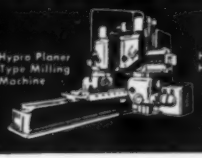
5 **RECOMMEND (AND DESIGN IF NECESSARY) THE TOOLS TO USE** — If conditions warrant, G&L will recommend the standard machine accessories, arrangements and tools you can use to make your equipment more productive—more versatile in application. If special equipment is needed, it will be designed to agreed specifications and made a part of your order.

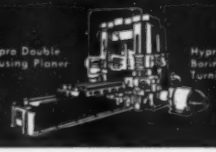
Write, wire or phone G&L or its nearest representative today. Get the facts on your needs — your problems. Get a G&L unbiased Job Analysis to help you. Don't hesitate — there's no obligation . . . AND DELIVERY MAY BE BETTER THAN YOU THINK!

How to get a G&L job analysis

Call your nearest G&L dealer or write us direct. Furnish our Job Analysis Engineers with blueprints, job data, and production requirements. Factory engineers will completely analyze your machining problems. There's no charge, no obligation. Don't hesitate — do it today.

MACHINE TOOL CO.





G&L HYPRO

FOND DU LAC
WISCONSIN

Something
NEW

Van Keuren CALIBRATED STEEL BALLS

Set No. B 23. Calibrated Steel Balls, 23 sets of 3 each 1/16 to 1/2" by 32nds and 9/16 to 1" by 16ths. Complete in Mahogany Case $150.00

Use VK calibrated steel balls for the precise measurement of internal annular grooves and for comparative measurements on throated worm wheels.

VK calibrated steel balls are selected grade A balls, which are within .0003" of nominal size, but which have calibrations accurate within 25 millionths of an inch.

Complete details on this and other Precision Measuring Tools are given in the Van Keuren 1952 Catalog and Handbook No. 35.

Write for your copy

THE *Van Keuren* CO.,
33rd YEAR
173 WALTHAM STREET, WATERTOWN, MASS.
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

HERE'S PROOF...

that LINK-BELT's Fluid Drive with constant CUSHION ACTION cuts machinery wear and tear

Cutaway shows simple, rugged construction of Link-Belt Fluid Drive.

NOW you can use smaller motors and power transmission equipment on your toughest drive problems. What's more, both motors and driven machines will last longer with Link-Belt Fluid Drives.

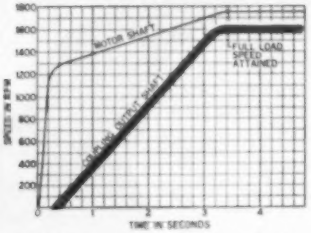
That's because constant CUSHION ACTION provides shock and overload protection . . . and at the same time eliminates high starting torque requirements and high starting currents.

Look at the three sets of curves shown here. See for yourself how constant CUSHION ACTION is the money-saving answer for loads of the high inertia, repetitive shock or high starting torque type.

For complete information, write for Book 2485. It shows how you can put five types of Link-Belt Fluid Drives to work in your plant: Electrofluid Drive, Electrofluid Gearmotor, Fluid Drive, Fluid Gear Drive and Fluid Coupling Drive. 12,810

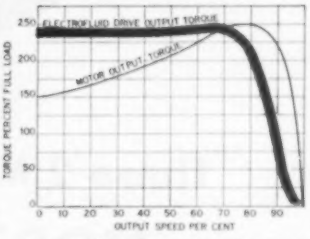
LINK-BELT
FLUID DRIVES

Smooth acceleration - -



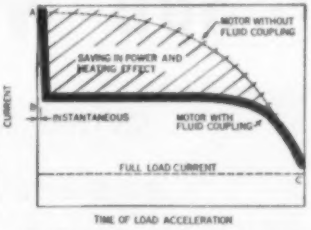
Typical motor and coupling acceleration curves for a high-inertia load show how CUSHION ACTION smoothly and gradually accelerates the load, saving wear and tear on vital equipment.

No overpowering - -



Compare the output torque of a motor with and without the fluid coupling. Because motor accelerates free of load, it reaches maximum pull-out torque that might otherwise require a special type of oversize motor.

Low starting current - -



As these current consumption curves show, with the fluid coupling, motor starting current drops instantaneously to less than half the starting current required by a motor without fluid coupling. Difference represents power savings, reduced heating.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

Handiest pair for portable grinding! With Norton BD *rigid* and BFR *semi-flexible REINFORCED RESINOID* Hub Wheels always on hand, you'll do more jobs better with your standard portable grinders and sanders than ever before. Faster, easier and safer, too! Try them and see.

These 2 Multi-Job NORTON *reinforced* hub wheels

grind faster... easier...and can't fly apart!

Lighter and easier to handle than cup wheels! Longer lasting than coated abrasive discs. More versatile than either! That's the handiest pair in portable grinding . . . the time-tested Norton BD rigid hub wheel and the sensational new Norton BFR semi-flexible hub wheel.

What a difference they'll make in your shop. For grinding jobs where finish is more important than stock removal — and especially for blending corners and contours — the new BFR semi-flexible hub wheel is your best bet. For more severe work where stock removal is important, your vote goes to the BD wheel. Check the chart at the right.

Both cut fast . . . thanks to their sharp, durable aluminum oxide abrasive and special resinoid bond.

Both are nylon-web-reinforced, for extra safety. They hold together even if accidentally cracked until the machine can be stopped and the wheel changed.

Ask your nearby Norton Distributor to demonstrate these versatile Norton *Reinforced* Hub Wheels to you. He's listed under "Grinding Wheels" in your classified telephone directory. Or write for new Bulletin 225. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. EXPORT: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

What versatility!

Just a few of the jobs you can do with the handiest, safest pair for portable grinding. Where both types of wheels are indicated choice is dependent on the nature of the job.

THE JOB	BD RIGID	BFR* SEMI-FLEXIBLE
Removing rust and scale, scarfing and beveling before welding	A24-O14BD	A24-K BFR
Cutting away, smoothing and blending welds on fabricated work	A36-O14BD	A24-K BFR
Making V cut to remove old weld materials for salvaging steel parts	A24-R14BD	
Removing burrs and sharp edges from steel sheets and plates	A36-R14BD	A24-K BFR
Roughing off excess weld material before smoothing with coated abrasive discs	A24-O14BD	A24-K BFR
Cutting off gates and risers on brass, bronze and aluminum castings		A24-K BFR
Notching large gates and risers on all kinds of castings	A24-R14BD	A24-K BFR
Cleaning between teeth of large marine and industrial gears	A36-O14BD	
Removing mold marks and smoothing castings before painting		A24-K BFR
Smoothing flame-cut edges on heavy steel sheets and plates	A24-R14BD	
Smoothing stainless steel welds	A24-O14BD	A24-K BFR
Smoothing and blending copper, bronze, aluminum and stainless steel surfaces	A24-O14BD	A24-K BFR

*A24-K BFR is considered a good all around specification but for jobs where finish is not important 16 grit will give somewhat longer wheel life.

1. **Cutting down a heavy weld** is quick and easy for you with a Norton BD rigid wheel.

2. **Blending in a welded corner** is a job you can do faster and better with a Norton BFR semi-flexible wheel.

3. **Smoothing out a welded radius** also calls for a work-hugging BFR semi-flexible wheel.

4. **Smoothing a flame-cut edge** comes naturally to an extra-strong, extra-safe BD rigid wheel.

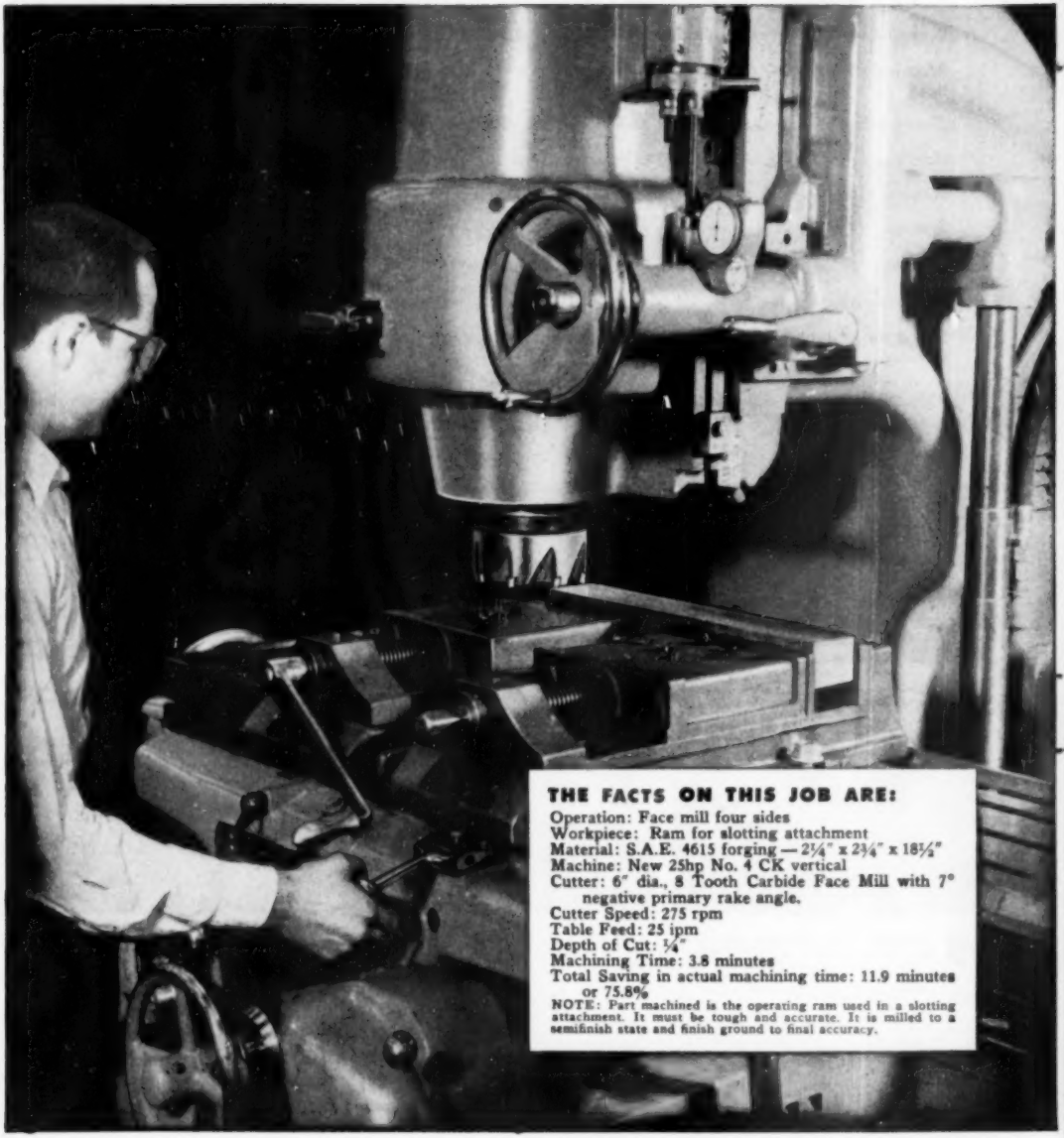
5. **Cleaning out fins** of a compressor casting is a tough job made easy by a BD rigid wheel.

6. **Notching risers on gray iron castings** is an easy job for either the BD or BFR wheel. Take your choice.

Making better products to make other products better

NORTON ABRASIVES

facts tell the story { NEW CUTS



THE FACTS ON THIS JOB ARE:

Operation: Face mill four sides
Workpiece: Ram for slotting attachment
Material: S.A.E. 4615 forging — 2¼" x 2¾" x 18½"
Machine: New 25hp No. 4 CK vertical
Cutter: 6" dia., 8 Tooth Carbide Face Mill with 7° negative primary rake angle.
Cutter Speed: 275 rpm
Table Feed: 25 ipm
Depth of Cut: ¼"
Machining Time: 3.8 minutes
Total Saving in actual machining time: 11.9 minutes or 75.8%

NOTE: Part machined is the operating ram used in a slotting attachment. It must be tough and accurate. It is milled to a semifinish state and finish ground to final accuracy.

KEARNEY & TRECKER MILWAUKEE CK MILLING MACHINE PRODUCTION TIME 75%

4615 ALLOY STEEL FORGING MILLED IN 3.8 MINUTES . . . FORMER TIME 15.7 MINUTES

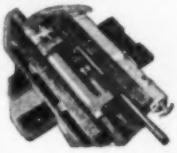
C-K MILLING MACHINE FEATURES THAT HELP DO THIS JOB BETTER

Greater rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.

New CK machines have Greater Horsepower. On this job, 25hp permitted operator to get maximum production from his modern cutter.

CK's 3-bearing spindle and flywheel assured Maximum Cutter Efficiency. On this job, it meant fast metal removal and excellent finish in a single pass.

The new Kearney & Trecker CK milling machine on this job has 24 different spindle speeds (13 to 1300 rpm). Its 32 different table feeds range from ⅜" to 90" per minute. Operator was able to pick proper *speed and feed* — to take full advantage of high horsepower and modern tools. The result — Greater Productivity on this job.

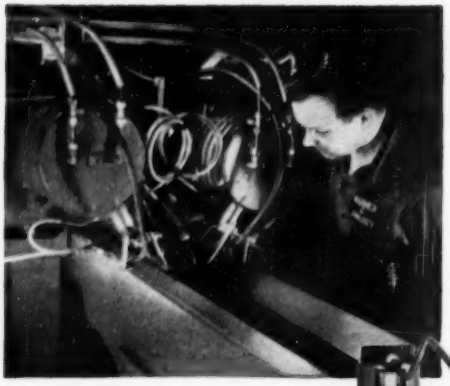


CK's new heavy duty (2" dia.) table feed screw gives greater bearing contact for smoother feed performance and sustained accuracy.

New 25hp No. 4 Model CK vertical

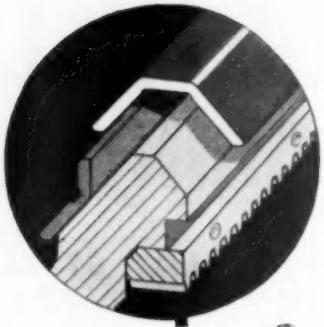
It will pay you to see the new CK line of milling machines — check them against your own requirements. You'll notice how every feature is designed and job-proven to give you cost-cutting results—greater machine capacity, productivity and better finished products. So, for the full story, contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

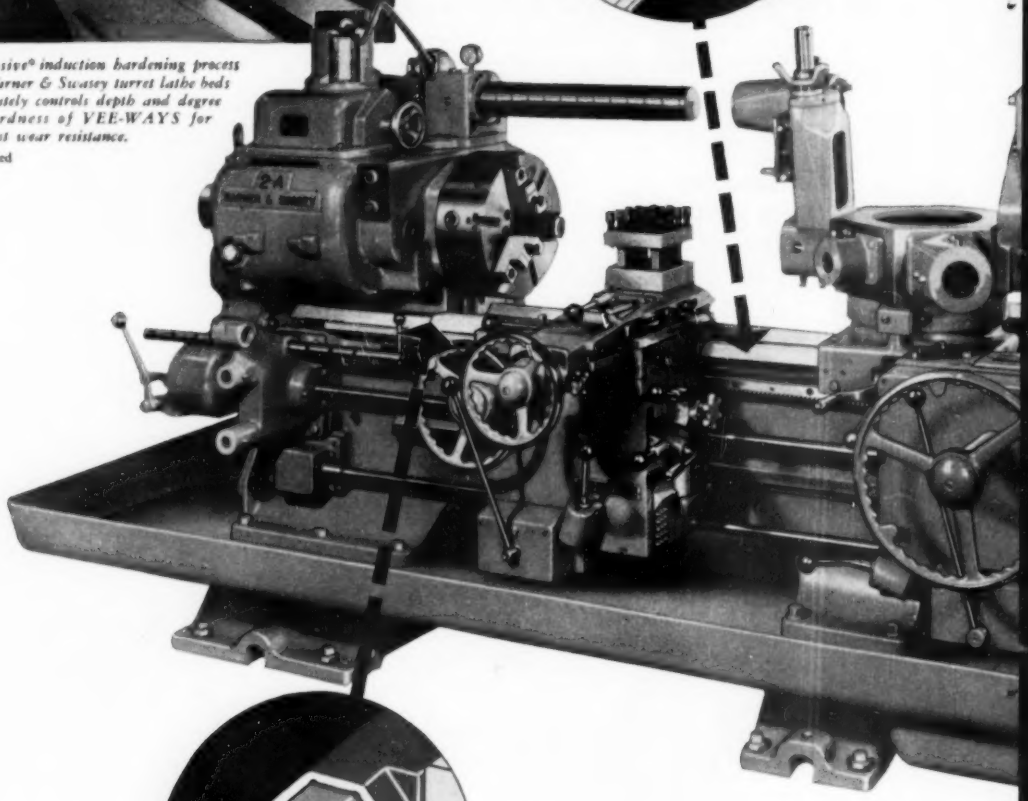
KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

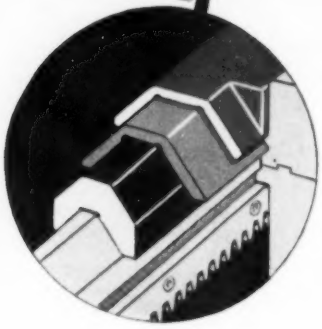


Exclusive induction hardening process on Warner & Swasey turret lathe beds accurately controls depth and degree of hardness of VEE-WAYS for greatest wear resistance.*

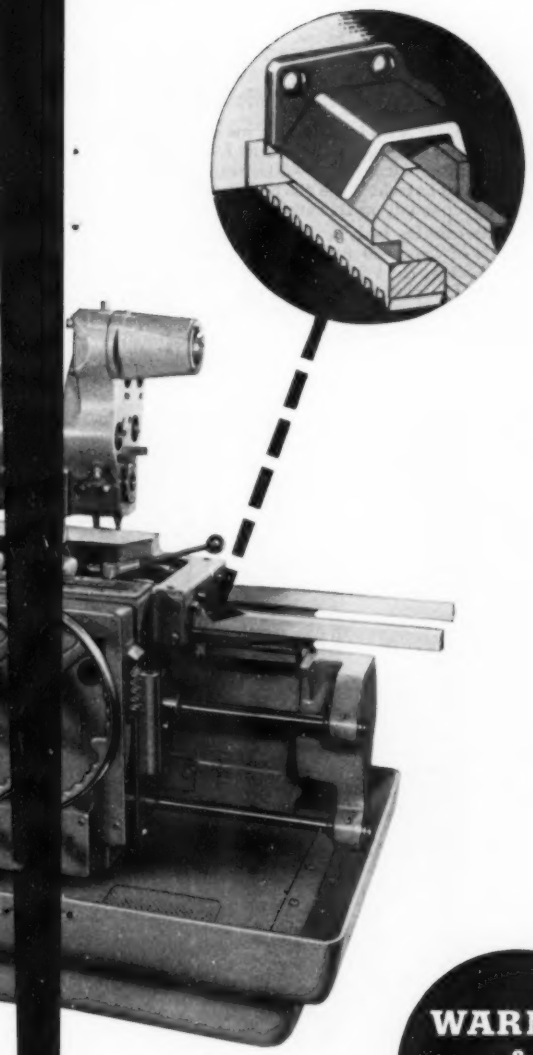
*Patented







YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER



FOR ACCURACY

there is no substitute for VEE-WAYS

NEW MACHINE ACCURACY is maintained for many extra years because of one basic design feature which is distinctive to all Warner & Swasey Saddle Type Turret Lathes.

VEE-WAYS are cast as an integral part of the Diagonal Ribbed, one-piece bed. After induction hardening by an exclusive process for greatest wear resistance, the VEE-WAYS are ground to precision smoothness. The most heavily loaded saddle slides over the ways with such ease that hand wheel control is almost effortless for the operator.

The VEE-shape distributes weight and pressure of saddle and loaded turret to make carriage self-aligning. The heaviest roughing cuts and the finest finishing cuts are taken without necessity of adjustment—without possibility of weaving.

Patented telescoping way covers (see diagrams) completely protect the VEE bed from scratches from chips or damage from dropped tools. Equally important, the way covers prevent the floods of coolant from washing away the film of lubricant carried to the ways by automatic lubrication.

VEE-WAY construction is only one of many dictinctive Warner & Swasey features, but it represents a fundamental principle which makes Warner & Swasey Turret Lathes so easy to operate, and so outstandingly efficient in preserving extreme precision during long years of hardest service!

WARNER & SWASEY
Cleveland

& SWASEY TURRET LATHES, AUTOMATICS, AND TAPPING MACHINES

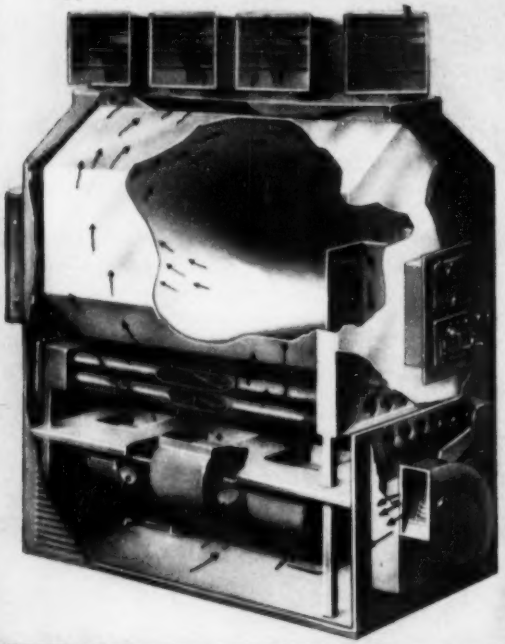
Manufacturers now using

DRAVO CORPORATION, Pittsburgh, Pa.

Here's an application of Type 430 Stainless Steel that deserves special attention, because the switch to Type 430 was made before current restrictions on nickel-bearing Stainless Steels were imposed.

When Dravo Corporation redesigned its self-contained, direct-fired Counterflo Heater after World War II, the firm's engineers found they could increase efficiency, reduce size and weight, avoid troublesome refractory maintenance, speed up production and reduce manufacturing costs by building the combustion chamber of U·S·S Stainless Steel. Initially, both nickel-bearing and straight-chromium grades were used.

But in May, 1950—a month before Korea and several months before severe restrictions were placed on nickel-bearing grades—Dravo engineers decided to standardize on Type 430. This straight-chromium grade was found entirely suitable for the application, fully meeting requirements for high temperature operation. Maximum temperature that this combustion chamber is required to withstand is 1300°F. No problems have been encountered in brake-forming and welding Type 430.

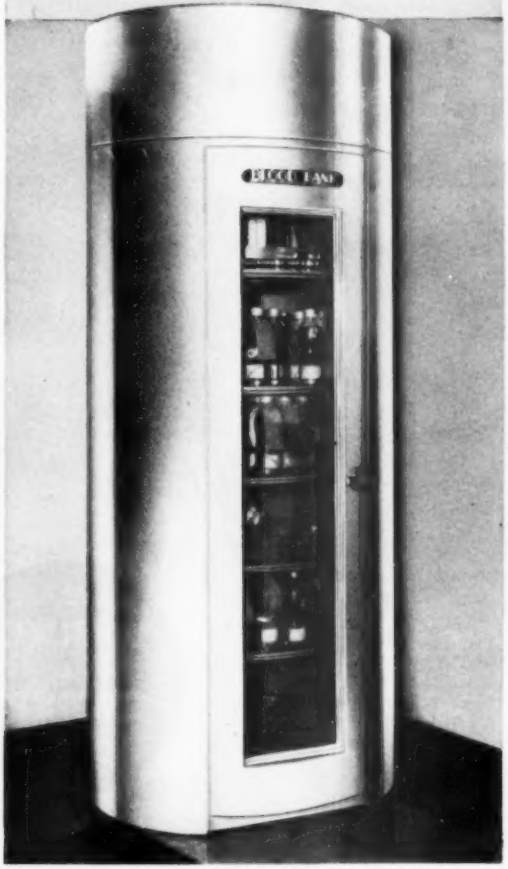


Welding operations on Type 430 Stainless Steel present no problems in fabricating the combustion chamber of the Dravo Counterflo Heater. Above is a cutaway view of the Dravo Counterflo Heater used in commercial and industrial space heating.

RUSLANDER & SON, INC., Buffalo, N. Y.

Ruslander & Son, Inc., is now manufacturing its circular refrigerators—used as blood banks or pharmacy refrigerators—from Stainless Steel inside and outside. Type 430 Stainless has been used successfully in this application.

The exterior body is formed from 20-gage sheets of Type 430 and the interior walls, top and bottom from 22-gage sheets of the same grade. In fabrication, the Type 430 sheets undergo shearing, rolling, punching, drilling, braking and soldering.



For cleanliness, appearance and durability, this blood bank refrigerator is Stainless Steel inside and outside. Type 430 has been used in this application with excellent results.

U·S·S 17 (Type 430) Stainless Steel

report good performance in fabrication and end use

HEYWOOD-WAKEFIELD CO., Gardner, Mass.

To give the protective edge and back pans of its bus seats greater durability and better appearance, Heywood-Wakefield Co. has used Stainless Steel. More than a year ago, the firm switched from a nickel-bearing grade to Type 430.

This straight-chromium grade, used in the same gage as the nickel-bearing Stainless used previously, has given completely satisfactory performance.

● Current restrictions on use of nickel-bearing grades of Stainless Steel have led manufacturers to turn their attention to such available straight-chromium grades as U·S·S 17 (Type 430) Stainless Steel. And they are reporting exceptionally fine experience with this grade, both in the shop and in service.

The applications shown here are typical of the jobs on which straight-chromium Stainless Steel is being used. And the fabricating methods are common to most metal-working shops.

In U·S·S 17 Stainless Steel or other straight-chromium grades you may find the answer to your current production problems. Our representatives will be glad to advise you concerning these steels and especially on their use under the conditions of your fabricating operations.

The protective edge and back pans of these bus seats are Type 430 Stainless Steel. Performance of the material during forming operations and in end use has been completely satisfactory.

UNITED STATES STEEL COMPANY, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS·STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

USS

2-1403

UNITED STATES STEEL

THE *New*

NEW BRITAIN

Copying Lathe

Chips have been a major problem on conventional lathes for a hundred years. With the advent of carbide tools, the chip problem has been even more serious. In designing the new New Britain **+GF+** we have, in effect, turned the lathe on its side. The conventional bed has been eliminated, and the copying saddle in which the cutting tool is mounted, is below the spindle. The flow of chips from the fast-cutting carbide tool, falls entirely free, and the chip pile accumulates through the back of the machine for convenient removal.

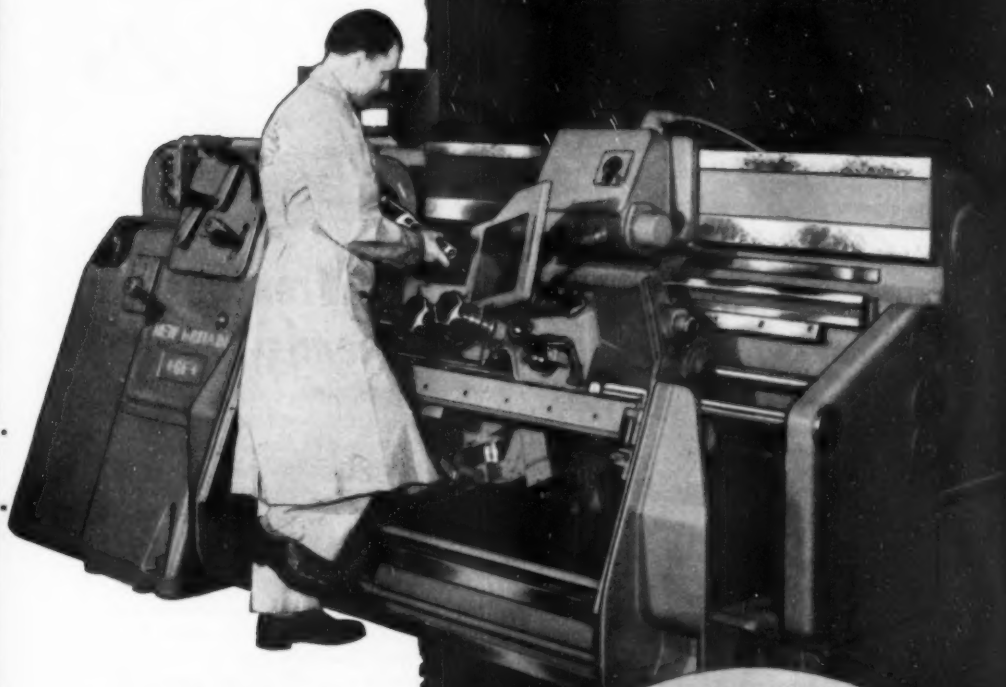
The New Britain **+GF+** copying lathe operator handles the controls, loads and unloads using the power operated tail stock, sets up and adjusts template or prototype, *all from the front of the machine.*

For the new developments in metal turning efficiency, consult your New Britain Sales Engineer first. You'll find it literally true that New Britains are *machines for making progress.*

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES
NEW BRITAIN **+GF+** COPYING LATHES

+GF+

A COMPLETELY NEW PRINCIPLE PRODUCES A MAJOR IMPROVEMENT IN LATHE DESIGN.



The New Britain **+GF+** copying lathe, created by George Fischer Limited, Schaffhausen, Switzerland. Adapted to American power input requirements and *manufactured in the United States* by New Britain Machine. New to America, the New Britain **+GF+** is the result of fourteen years' development. Hundreds are in successful use the world over.

NEW BRITAIN
Automatics
THE NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

ARMSTRONG WRENCHES

Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.

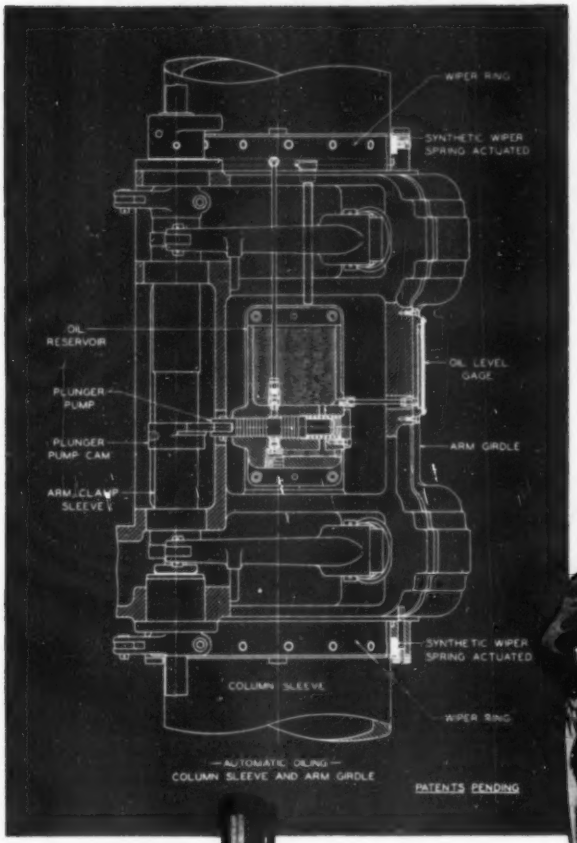
WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"*
5215 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

Just a memory now

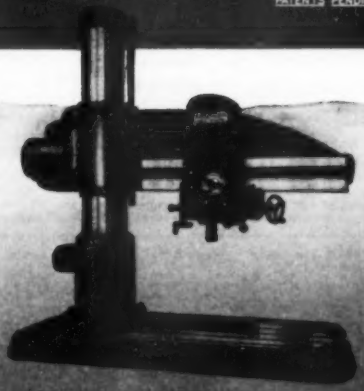
Column Scoring a thing of the past...

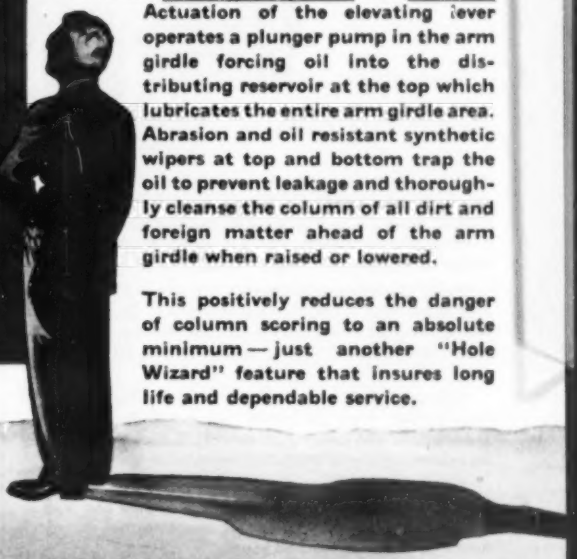
We've done something about it—



On the new "AMERICAN" Hole Wizard Radial the arm girdle and its mating column area are automatically oiled and cleansed. Actuation of the elevating lever operates a plunger pump in the arm girdle forcing oil into the distributing reservoir at the top which lubricates the entire arm girdle area. Abrasion and oil resistant synthetic wipers at top and bottom trap the oil to prevent leakage and thoroughly cleanse the column of all dirt and foreign matter ahead of the arm girdle when raised or lowered.

This positively reduces the danger of column scoring to an absolute minimum — just another "Hole Wizard" feature that insures long life and dependable service.





Bulletin No. 327 describes this and other exclusive "Hole Wizard" features of proven value. Want one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Only a Lathe Specially DESIGNED for copying Gives Full Copying Lathe Results!

HIGH SPEED HYDRAULIC COPYING LATHES

Only an absolutely rigid, chatter-free machine with built-in tracer device—*not an attachment*—can give you maximum output, accuracy and finish. For amazing speed in finish-turning without rejects you can depend on the H.E.B. designed for automatic copy-turning from the base up!

Costly down-time is eliminated with the H.E.B. Hydraulic Copying Lathe. Takes no more than 10 to 20 minutes for setting, and the finished parts are copy-turned up to 300% faster than on multi-tool lathes. Economical for short runs, too!

With its 20 H.P. motor the **OP Model** takes heavy cuts with carbide tools at spindle speeds 50 to 3600 RPM. **GT Models** with rotating pattern are designed for copying an infinite variety of irregular, non-circular work.

Over a thousand of these modern copying lathes are now in use throughout the world. . . . Designed and built in France by H. Ernault Batignolles, machine tool manufacturers for almost a hundred years!

See for yourself how fast this revolutionary machine can pay for itself. For complete information, or to arrange demonstration in New York, Detroit or Los Angeles showrooms, call your nearest H.E.B. representative now!

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"THE WAY TO TURN"

DELIVERY FROM STOCK . . .
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H.E.B. MACHINE TOOLS, INC.
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COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • TOOL ROOM LATHES • CARBIDE TOOL GRINDERS

The wheel head tilts! on the #20 Cutter and Tool Grinder

That's why no other cutter and tool grinder does so many jobs so fast ...so easily!

FEATURING GREATLY INCREASED VERSATILITY, the Norton No. 20 Cutter and Tool Grinder brings new speed and economy to the widest range of tool and cutter grinding jobs.

The wheel head can be tilted up to 15° above or below horizontal, and swivelled through 360° — simplifying such ordinarily difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

Other advantages that make this Norton cutter and tool grinder easier to set up and operate include: greater lengths of table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dials readable from any position . . . automatically lubricated table ways . . . electric equipment built to Machine Tool Builders' standards . . . wheel spindle reversing switch (optional) for carbide grinding.

Part of the world's most complete line of grinding machines, the No. 20 is a typical development of Norton's engineering leadership.

Remember — only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. This leadership is at your service for your present or "post emergency" problems.

Why not investigate how the No. 20 can modernize and speed up tool and cutter grinding in your plant. See your Norton Representative for detailed information — and ask him about Norton Cutter and Tool Grinders Nos. 1 and 2, and the Bura-way Grinder for automatic lathe tools. Meanwhile, write direct for Catalog 189. NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize Modernize With **NEW**

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Making better products to make other products better

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ALLIS-CHALMERS

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YOUR DRIVE DESIGN PROBLEMS

Allis-Chalmers Matched Motors, Control and V-Belt Drives Save Design Time and Cut Manufacturing Cost

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Complete matched control for any motor, including manual and magnetic starters, pushbuttons, and variable speed control.

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Standard open drip-proof, splash-proof, totally-enclosed, fan-cooled and explosion-proof, ½ hp and up. Also wound rotor and direct current. Special motors to meet your requirements.

Texrope V-BELT DRIVES

Fixed speed and *Vari-Pitch* sheaves with stationary or motion control. Famous grommet belt construction. Most complete line of V-belt drive equipment in the industry.

Get the Kind of Help You Need

Allis-Chalmers representatives in every industrial center are at your command. Just call the office nearest you or write Allis-Chalmers, Milwaukee 1, Wisconsin for helpful literature.

Allis-Chalmers Motors and Control	**51B6052**
***Texrope* V-Belt Drives**	**20B6051**

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

A-3449

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

2 operations in 1 pass

broaches and swages more than 160 parts per hour

Accuracy and power combined on an American 25 ton press —

1. *Broaches 32 serrations in a 7/8" diameter hole in a Pitman arm.*
2. *Swages the serrations to a 3/4" taper per foot.*

Your next broaching problem can be solved more economically by broaching the American Way . . . because American designs and builds all three . . . broaches, machines and fixtures. To start American engineers working on your problem, send a part-print or sample and hourly requirements. *Write today for Circular No. 300.*

The broaching stroke is started by manual control. The broach and swage assembly is held in accurate alignment by twin guide posts built integral with the broach push head. The 32 serrations are broached and then swaged under 25 tons pressure in one pass. On the return stroke, the broach is stripped from the part by a plate in the fixture.

AMERICAN **American BROACH & MACHINE CO.**

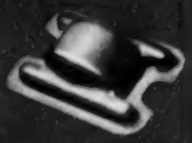
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

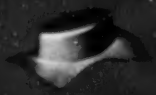
ANN ARBOR, MICHIGAN

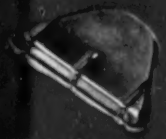
SUNDSTRAND

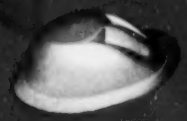
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

A major advance in metal forming!

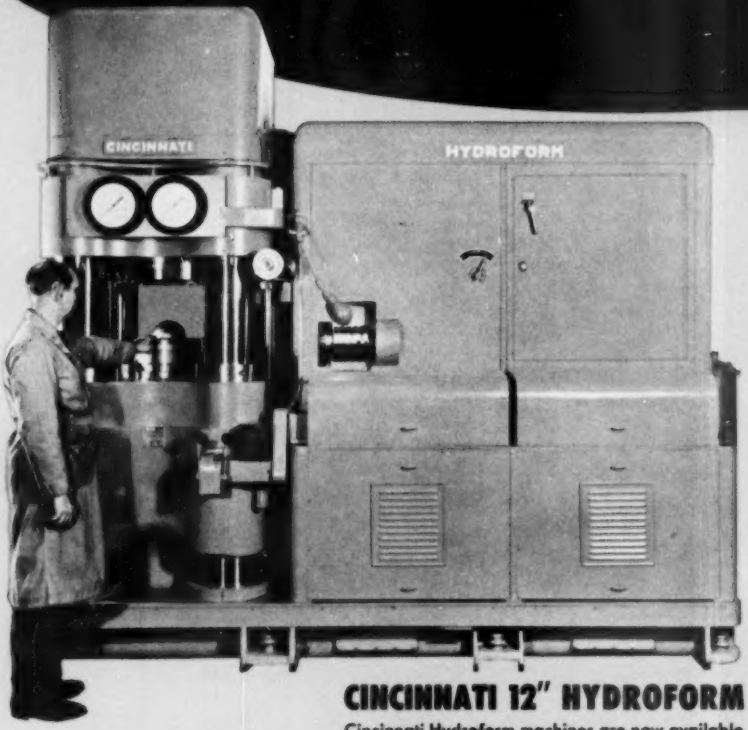








NEW CINCINNATI



CINCINNATI 12" HYDROFORM

Cincinnati Hydroform machines are now available in five sizes, capable of handling blanks 12", 19", 23", 26", and 32" in diameter. Maximum depth of draw ranges from 7" on the 12" machine to 12" on the 32" machine. Information on larger machines furnished on request.

NEW HYDROFORM BULLETIN

For a complete description of Hydroforming — tooling details, operation, examples of Hydroformed parts, machine dimensions and specifications —write for your copy of Bulletin M-1759.

Hydroform

THE CINCINNATI MILLING MACHINE CO
CINCINNATI 9, OHIO

Hydroform

simplifies deep drawing . . . brings to deep drawing many advantages over other metal forming processes!

Hydroforming has revolutionized deep drawing. Practically any shape can be drawn from a wide variety of materials up to ⅜" thick. Most parts can be Hydroformed in a single operation. Tool costs are reduced up to 90%. Part quality is materially improved.

HYDROFORM TOOLING

The Cincinnati Hydroform eliminates the conventional and costly mated punch and die assembly. (See diagram "A".) An oil cavity, sealed by a flexible die member, serves as a universal die and upper blank holder.

Tools consist of a punch of the desired shape, and a draw ring contoured to fit around the punch. Tools are self-centering; self-aligning.

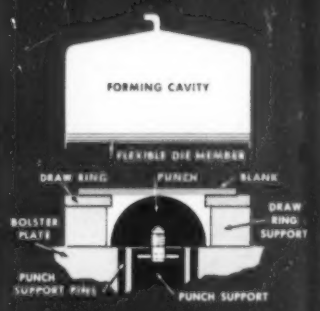
HYDROFORM OPERATION

In Hydroforming the part (see diagram "B"), the blank is placed on the draw ring and the flexible die member is lowered and locked in position. Pressure in the cavity is established at a predetermined setting. The punch is moved upward, forcing the flexible die member and blank to take the shape of the punch. The metal is uniformly shaped with a minimum of stretch or strain in the formed areas. Thin-out and spot stresses are virtually eliminated. Springback is reduced. Surface finish is unimpaired.

One Hydroform user says Hydroforming "represents the most notable advance in metal forming in twenty-five years." And many other manufacturers are now utilizing the far-reaching advantages of Hydroforming —producing such diversified items as

Hollow-ware • Ordnance and Aircraft Parts
Radio, Radar and Television Components
Appliance and Automotive Products • Many Others

Hydroforming has enabled these manufacturers to produce an improved part—in far fewer operations—at tremendous savings in tooling, labor and material costs. It has changed their thinking on deep drawing and forming. Investigate Hydroforming for your production.



CINCINNATI

fine tools that promote consistent accuracy

Even the most highly skilled machinist finds it easier to maintain high production with consistent accuracy when equipped with quality tools. The added assurance which they afford permits faster precision work with less fatigue.

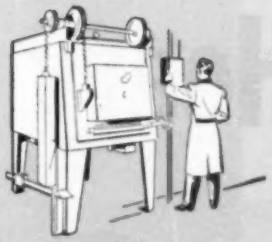
Brown & Sharpe supplies a complete line of Machinists' Tools that represent the fullest measure of sound design, precision manufacture and proven reliability. They are universally recognized by machinists as the criterion of quality tools.

Write for complete small tools catalog.
Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe BS

for toolroom or high production... quality HEAT-TREATING calls for a WESTINGHOUSE FURNACE...



Typical Westinghouse Box Furnace used in toolroom heat-treating for hardening. Other Westinghouse Furnaces available for carburizing, drawing, ageing, annealing, austempering, brazing, carbonitriding, martempering, nitriding, preheating, sintering, solution treatment.

There's a Westinghouse furnace to provide the exact answer for every heat-treating application . . . gas or electric. For toolroom or for low-to-medium production applications, choose from over fifteen standard types of box furnaces, ten protective atmospheres. J-10373

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HEAT-TREATING FURNACES

Westinghouse Electric Corporation,
Industrial Heating Department
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Please send me free booklet, "Westinghouse Furnaces for the Toolroom, Laboratory or Production Line"

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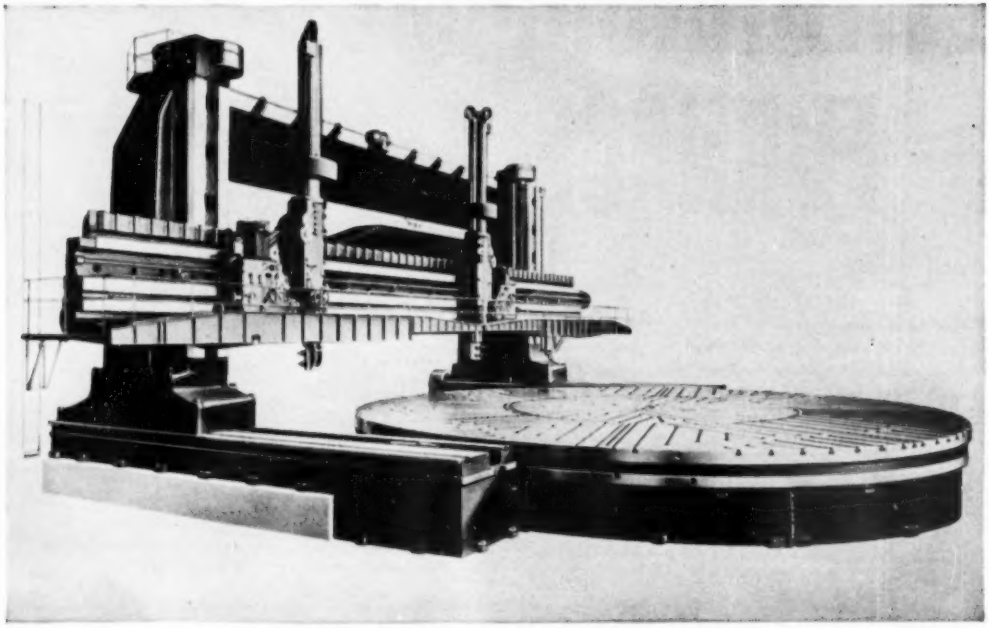
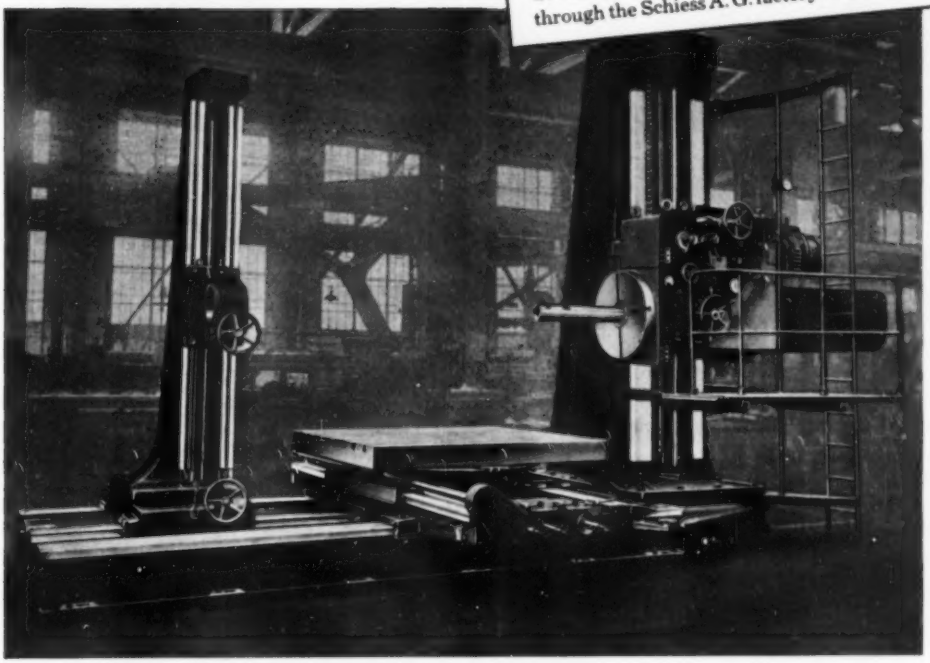
First time in U. S. A....

The World-famous Line of Schiess Heavy Machine Tools



MAMMOTH VERTICAL BORING MILL WITH 84 FT. TURNING DIAMETER, typical of the unusual heavy equipment built by Schiess. Smaller Schiess boring mills range from 71" to 98" turning diameter, and from 8' 2" to 23' with work capacity from 5 to 6 tons and 10 to 100 tons.

You are cordially invited to visit the Schiess Exhibit at the **Second European Machine Tool Exhibition, Hanover, Germany, September 14-23.** Schiess representatives will also gladly take you through the Schiess A. G. factory in Duesseldorf.



HORIZONTAL BORING AND MILLING MACHINES—Model WBF with traversing column and high speed internal spindle and Model TWBF 16 (shown here) with fixed column and moving table. Spindle diameter of Model WBF from 6¼" to 12⅜". Maximum boring diameter 47" to 134". Longitudinal traverse of main spindle 53" to 98". Motors 17½ to 50 H.P.

Machine tools don't come much bigger—or better—than SCHIESS builds them, and has been building them for over 72 years to meet the precision requirements of Europe's largest metal working plants. Machines like these, for example—

Vertical Boring Mills up to 84 ft. turning diameter.

Vertical Turret Lathes up to 71" turning diameter.

Horizontal Boring and Milling Machines up to 12⅜" spindle diameter.

Gear Hobbers for cutting gears up to 23 ft. diameter and larger.

Crankshaft Turning Machines with internal turning diameters to 112".

Locomotive Tire Lathes with internal boring diameters to 88½".

Tool Grinders for the heaviest carbide and high speed steel tools.

Now American Industry can also obtain these world-famous heavy producers—and promptly, too—with the assurance that technical assistance will always be close at hand from Schiess-trained engineers at Kurt Orban's Cleveland Service Center; also spare parts.

Several SCHIESS machines are shown here with limited specifications, but you'll want the whole story on the particular equipment that's big enough for your *biggest* job. So, why not write today.

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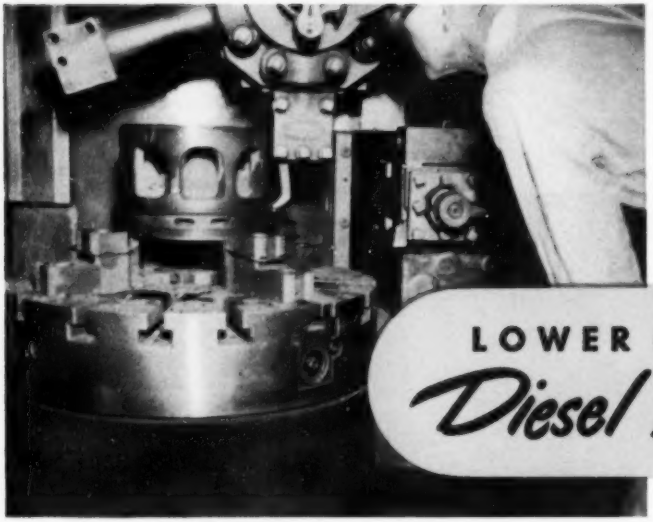


BULLARD

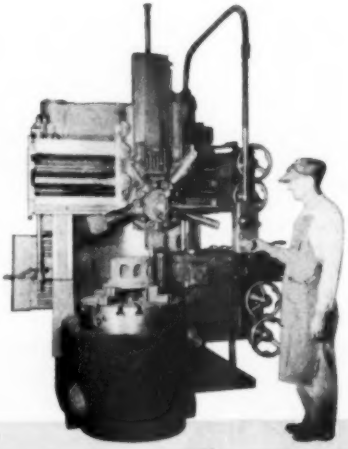
LOWER COSTS for...
Diesel Machining

IT is a fact that the Diesel has come of age on the nation's railroads. It has also inevitably come to an *age* where maintenance needs have increased by leaps and bounds.

In many shops throughout the country, the versatile Bullard Cut Master with its wide range of speeds and feeds, is handling a variety of urgently needed Diesel work and helping maintain enviable records for Diesel availability.

Shown above is a close-up of a typical operation in a Diesel shop of one of the major roads of the South. This 30" machine in use since 1944, is shown facing a joint on a Diesel cylinder lining head. The view below shows the same machine facing off the top of the cylinder lining head. Other operations in this sequence included roughing and finish. Another job regularly done by this Bullard is the machining of traction motor bearings.

The Bullard Cut Master V.T.L. and the Bullard Man-Au-Trol V.T.L. for automatic wheel machining, are built in six sizes: 30, 36, 42, 54, 64 and 74 in.



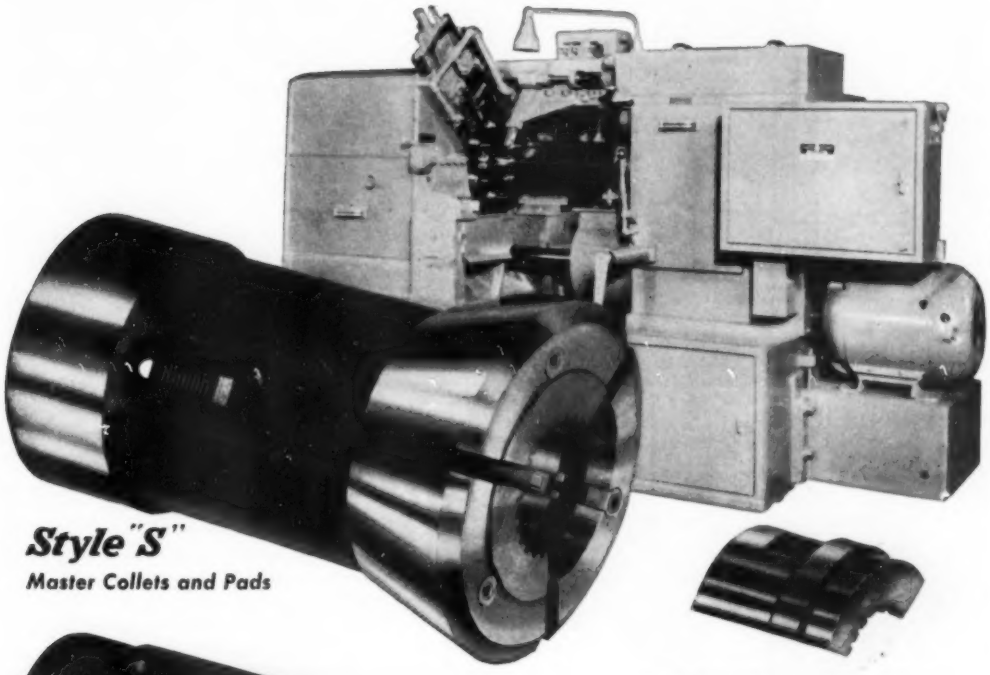
THE

BULLARD COMPANY

Bridgeport 2, Conn.

HARDINGE
ELMIRA, N.Y.

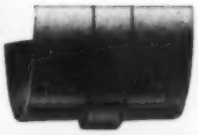
STANDARD EQUIPMENT
in Progressive Screw Machine Plants
The Only Master With NO Work Pressure On The Screw



Style "S"
Master Collets and Pads

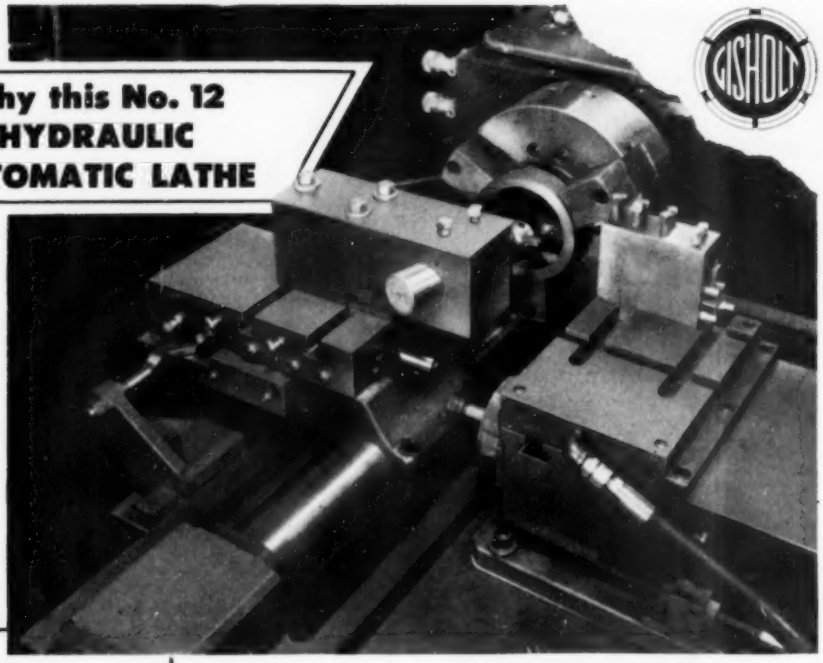
Pads Interchangeable Among Different Makes of Automatics

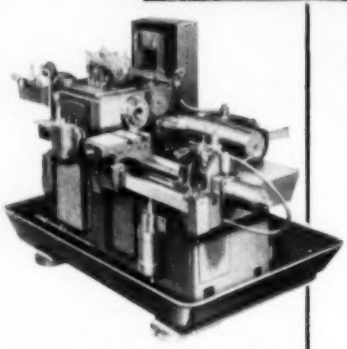
Style "B"
Master Feed Fingers and Pads



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

why this No. 12 HYDRAULIC AUTOMATIC LATHE





The Gisholt Hydraulic Automatic Lathe is a genuinely rugged 12" lathe, suited for light, fast jobs. Handles chucking, between centers, or fixture-held work.

maintains GREATER ACCURACY

Here, feed pressures are applied directly to tools without intermediate cams, arms or other linkage. Accuracy is further insured by feeding against dead stops. In all cuts there is a moment of dwell during which cuts are cleaned up.

Front carriage is mounted on and driven by the massive bar to which it is clamped. Wide lateral support of carriage assures rigid alignment without tremble or tremor.

Movement of the massive rear slide is by hydraulic piston in the base of the slide itself.

Both carriages are directly supported by the massive integrally cast cabinet type bed, and all bearing surfaces, ways and gibs are hardened and ground steel to assure permanent accuracy.

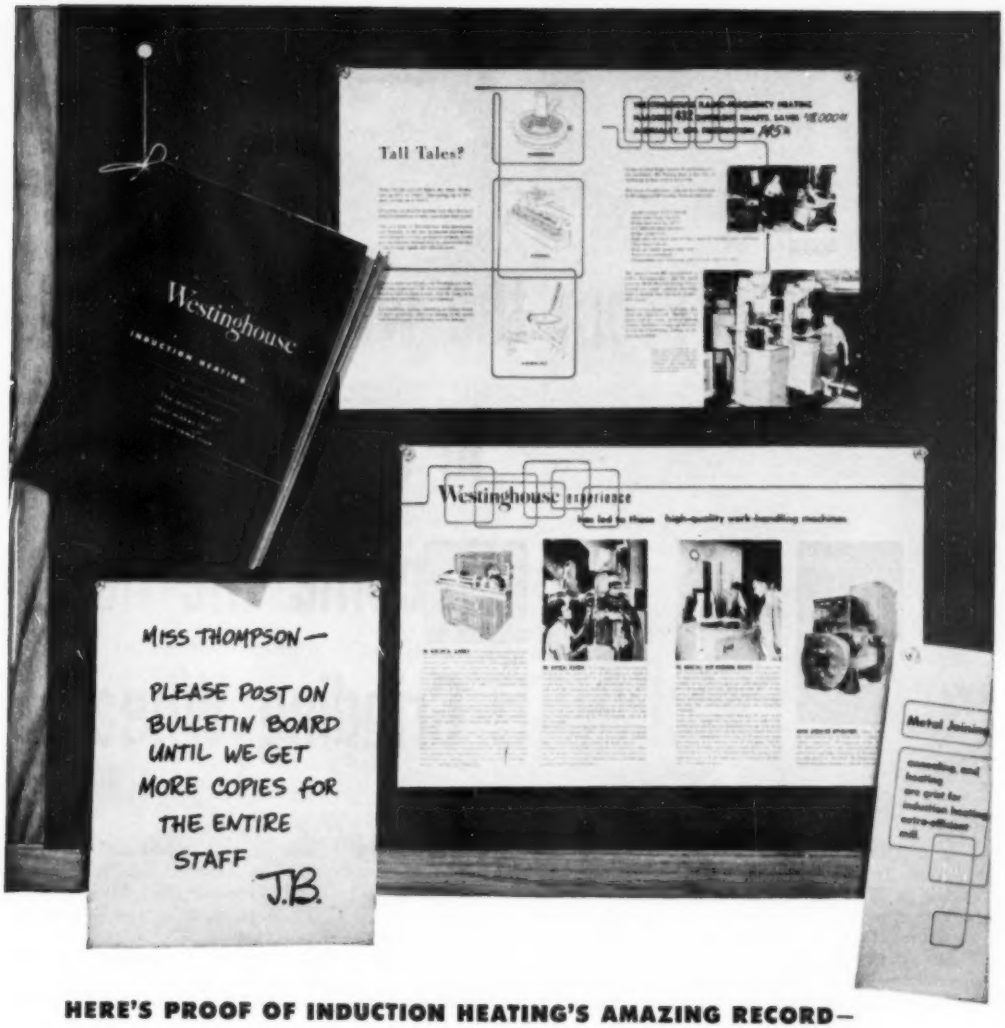
THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES



HERE'S PROOF OF INDUCTION HEATING'S AMAZING RECORD—

Actual case histories of hardening, brazing, soldering, and annealing installations show how the RF process has meant increased production (as high as 2000%), lower costs (as much as 90%), and a higher quality product for many of America's leading manufacturers. It's an amazing story — with facts and figures released by the companies themselves — and results that speak for themselves. See how these manufacturers' experiences may parallel your own . . . how RF Heating may help achieve production efficiency in *your* plant.

Send for this free booklet today — ask for B-4782. Write Westinghouse Electric Corporation, Department M-35, 2519 Wilkens Avenue, Baltimore 3, Maryland.

YOU CAN BE SURE...IF IT'S

Westinghouse

INDUCTION HEATING

J-10236

From the world's leader in machine tools come the new CINCINNATI Grinding Wheels

A practical approach to improvement in grinding wheels demanded frank recognition of the grinding wheel as a *cutting* tool. Cincinnati Milling research has proved that the grinding process is a true metal cutting process. The grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

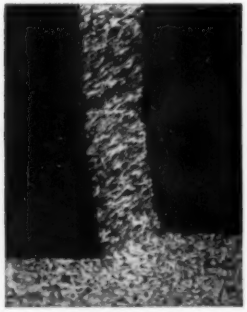
The essential factors involved in this vitally important matter of good chip formation are:

1. The tool must be well supported and properly presented to the work.
2. The chip must slide freely up the face of the tool.
3. Heat generated must be kept to a minimum.
4. The heat that is generated must be removed rapidly.

This is the beginning of a whole

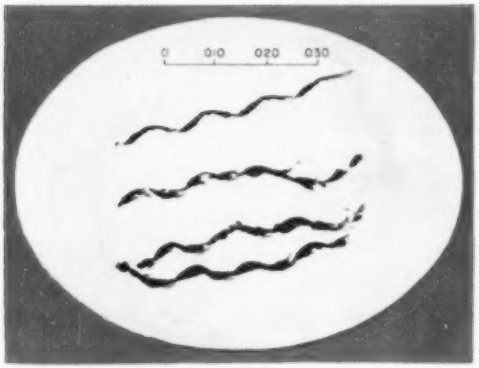
BASIC CHIP TYPES: Photomicrographs of cross sections taken through partially formed chips obtained under various conditions in machining operations such as turning, milling, planing and broaching.

Type 1—discontinuous or segmental chip.

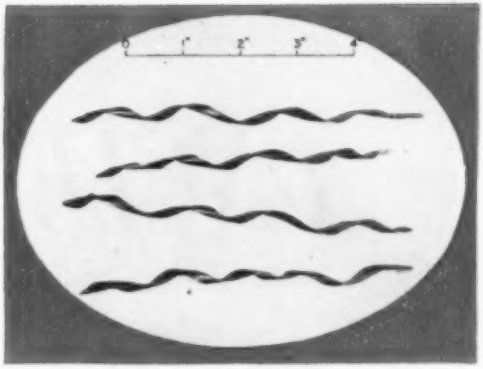


Type 2—continuous chip without built-up edge.

Type 3—continuous chip with built-up edge.



Type 2 chips obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible.



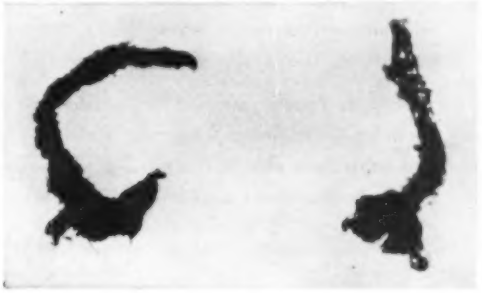
Type 2 chips obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips.

new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And, as you might expect, this basic new concept comes from the world's largest builder of machine tools.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as cutting tools forming recognizable chips.

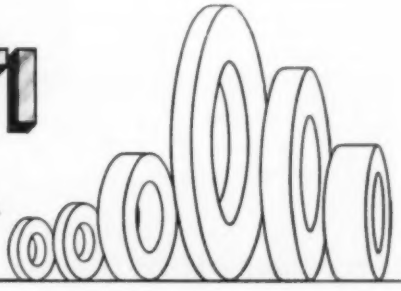
Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.

Type 1 chips obtained from grinding operation on cast iron. Typically discontinuous or segmental.



Type 3 chips obtained from slow speed grinding operation on SAE 1112 steel—continuous with built-up edge.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



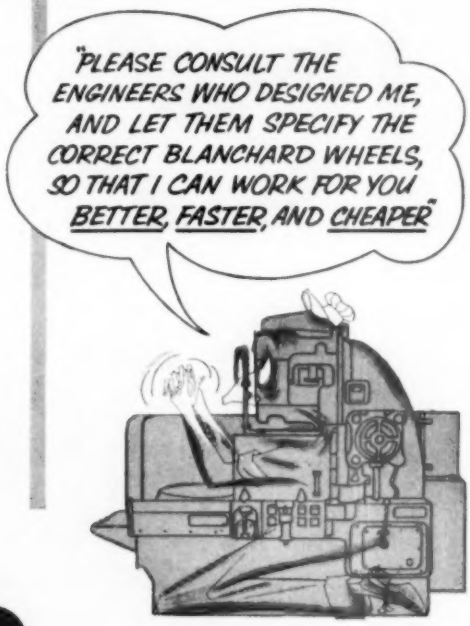
UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, *with proper grinding wheels, can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¾ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ±.0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.


"PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS, SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER"

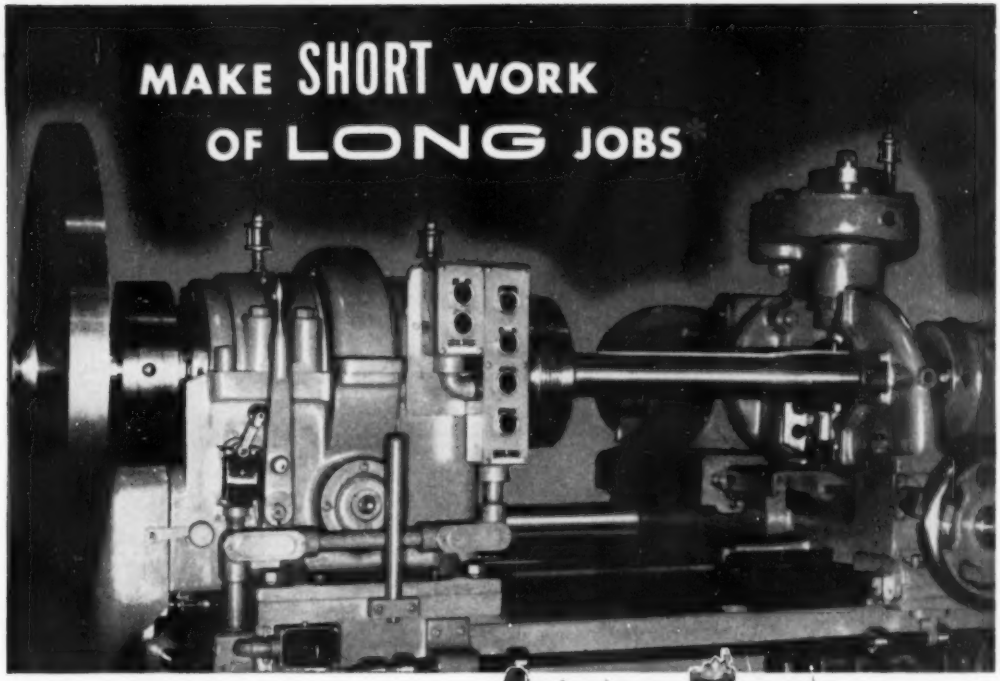
Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!

PUT IT ON THE BLANCHARD

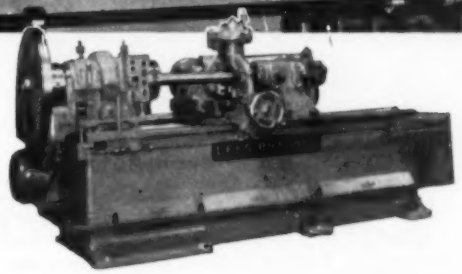
THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

MAKE SHORT WORK OF LONG JOBS



with the Lees-Bradner *End Loading* SH SPLINE HOBBER



"The SH hobs splines up to 144".

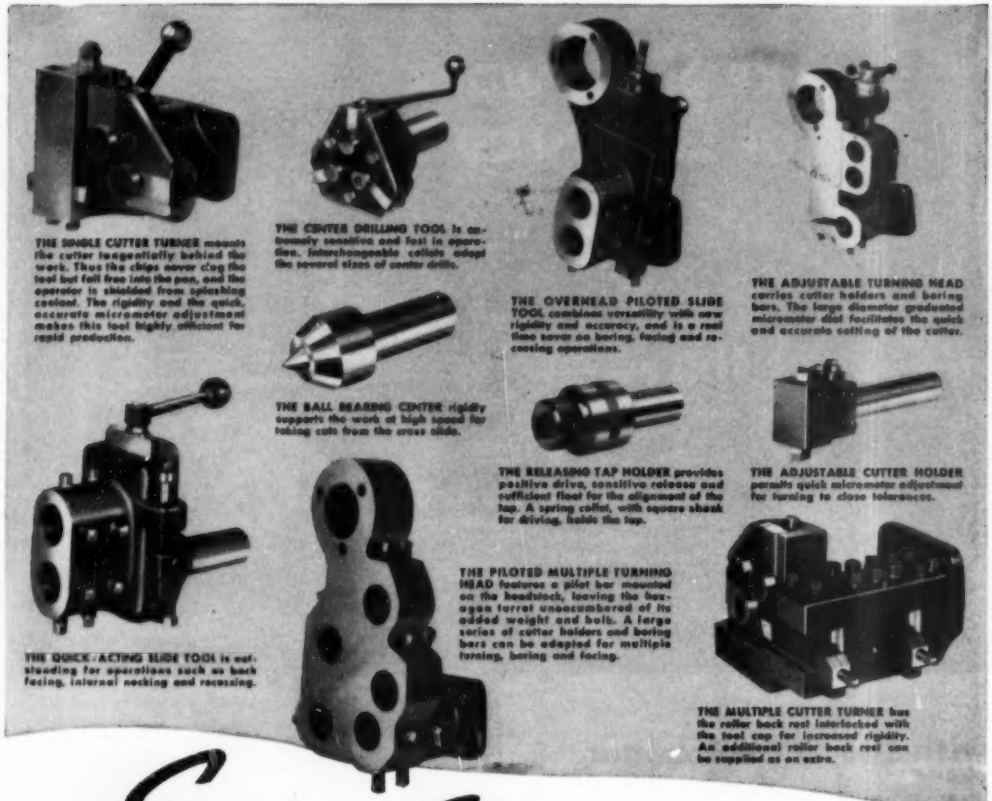
The exclusive Lees-Bradner "feed through spindle" feature enables the SH spline hobber to handle long and bulky parts with maximum efficiency and speed. It also provides the necessary support for long splines of small diameter.

The SH will hob splines up to six inches in diameter and can handle spur and helical gears up to eight inches.

Let Lees-Bradner, the first name in hobbing, be your first thought when you have a hobbing problem. Your Lees-Bradner representative will be happy to consult with you without obligation.

the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.



THE SINGLE CUTTER TURNER mounts the cutter tangentially behind the work. Thus the chips never clog the tool but fall free into the pan, and the operator is shielded from splashing coolant. The rigidity and the quick, accurate micrometer adjustment makes this tool highly efficient for rapid production.

THE CENTER DRILLING TOOL is extremely sensitive and fast in operation. Interchangeable collets adapt the several sizes of center drills.

THE OVERHEAD PILOTED SLIDE TOOL combines versatility with new rigidity and accuracy, and is a real time saver on boring, facing and recessing operations.

THE ADJUSTABLE TURNING HEAD carries cutter holders and boring bars. The large diameter graduated micrometer dial facilitates the quick and accurate setting of the cutter.

THE BALL BEARING CENTER rigidly supports the work at high speed for taking cuts from the cross slide.

THE RELEASING TAP HOLDER provides positive drive, sensitive release and sufficient float for the alignment of the tap. A spring collet, with square shank for driving, holds the tap.

THE ADJUSTABLE CUTTER HOLDER permits quick micrometer adjustment for turning to close tolerances.

THE QUICK-ACTING SLIDE TOOL is outstanding for operations such as back facing, internal necking and recessing.

THE PILOTED MULTIPLE TURNING HEAD features a pilot bar mounted on the headstock, leaving the hexagon turret unencumbered of its added weight and bulk. A large series of cutter holders and boring bars can be adapted for multiple turning, boring and facing.

THE MULTIPLE CUTTER TURNER has the roller back rest interlocked with the tool cap for increased rigidity. An additional roller back rest can be supplied as an extra.

Efficient Tools on your Turret Lathe

MEAN HIGHER PRODUCTION AND LOWER COST...

THE TOOLS SHOWN constitute only a few of the hundreds of different kinds and sizes of turret lathe tools that we build. Bardons & Oliver tools are outstanding in design and efficiency of metal removal, in ease of accurate size adjustments, and high quality of finish produced.

While these tools are designed primarily for use on the Bardons & Oliver ram and saddle type turret lathes, many of them can be applied to render other makes of turret lathes capable of increased production.

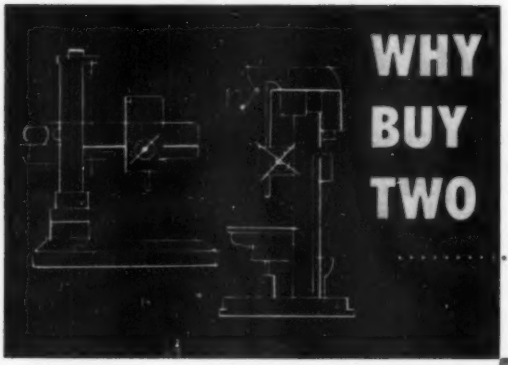
The latest cemented carbide cutters can be used to their full productive capacity in Bardons & Oliver tools.

These two tool catalogs will help you to select the proper tools for your turret lathes. Your copies will be mailed promptly, upon request.

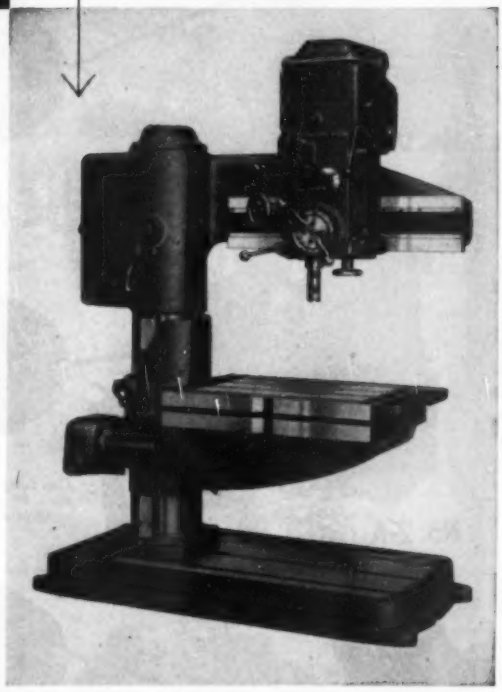
We build a complete line of ram and saddle type turret lathes, also automatic and hand operated cut-off machines.

BARDONS & OLIVER, INC.

1134 WEST 9TH STREET • CLEVELAND 13, OHIO



WHY BUY TWO ..... WHEN one WILL DO?



Fosdick's Sensitive Radial combines Upright and Sensitive features—rigidity, compactness and convenient table height—with the capacity and flexibility of a Radial. Fosdick has made the table unusually adjustable, leaving the arm at a fixed height. The unique, one-piece column construction makes possible unusual rigidity. Arm clamping is simplified. You get *all* the advantages of *both* the old reliable drills, at roughly the cost of one!

Workpiece sizes accommodated by the Sensitive Radial include the ranges of both Uprights and Radials; setting up on either the adjustable table or the base of the machine. Controls remain clustered at a constant, convenient operator's height.

YOUR TOOL DOLLAR buys more capacity in less shop space when you put Fosdick's compact versatility to work on your drilling problems. Only Fosdick builds the Sensitive Radial. Call your distributor or write for Bulletin SRM.

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

RADIAL DRILLS
SENSITIVE AND UPRIGHT DRILLS
JIG BORERS
AUTOMATIC POSITIONING MACHINES
SENSITIVE RADIAL DRILLS

FOSDICK

OUR TIME STUDIES WILL PROVE

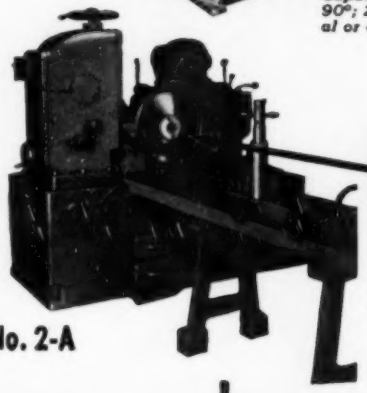
"It's the Cost per Cut that Counts!"

There's one economical way to cut off metal—by the Motch & Merryweather Triple-Chip Method. Speed, accuracy, square burrless ends, milled-finish pieces, — all contribute to profitable operation. Our wide experience in circular sawing covers all metals from magnesium to titanium. We are ready to demonstrate how the Triple-Chip Method will lower your costs.

No. 00-G

Material: S.A.E. 1020 tubing, 3" OD, .375 wall.
Production: 120 pieces per hour.
Tool Cost: $.0005 per piece.

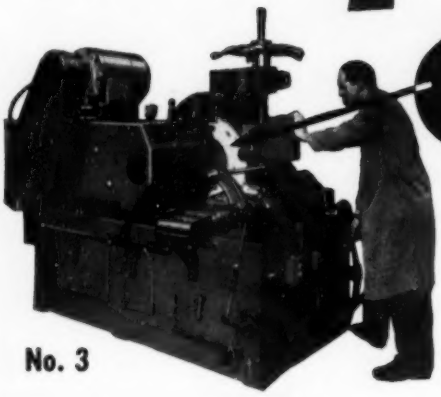
Capacity: up to 3" dia. at 90°; 2½" dia. at 45°. Manual or automatic stock feed.



No. 2-A

Material: S.A.E. 1020, 5" dia.
Production: 60 pieces per hour.
Tool Cost: $.001 per piece.

Capacity: up to 6½" dia., 6" square. Manual or automatic stock feed.



No. 3

Material: 18" - 70 lb. I-beam.
Production: 40 pieces per hour.
Tool Cost: $.0015 per piece.

Capacity: 9⅛" dia., 6" x 18" rectangular shape. Manual or automatic stock feed.

Also 2 Still Larger Sizes:

No. 4 *Capacity:* up to 16½" dia.

No. 5 *Capacity:* up to 43" dia.

Manufactured by — **THE MOTCH & MERRYWEATHER MACHINERY CO** —

CLEVELAND 13, OHIO

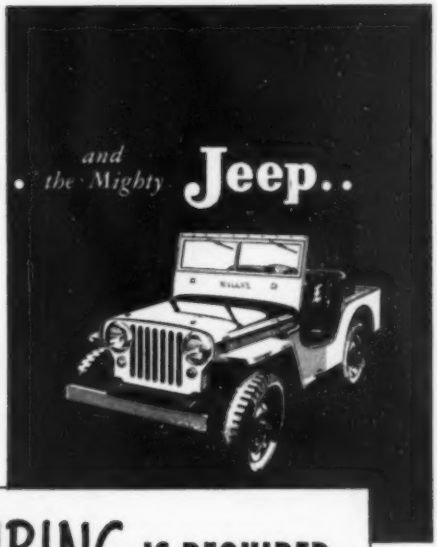
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

Only M & W builds ALL 3: CIRCULAR SAW, SAW BLADE, BLADE GRINDER

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

IN THE MANUFACTURE OF

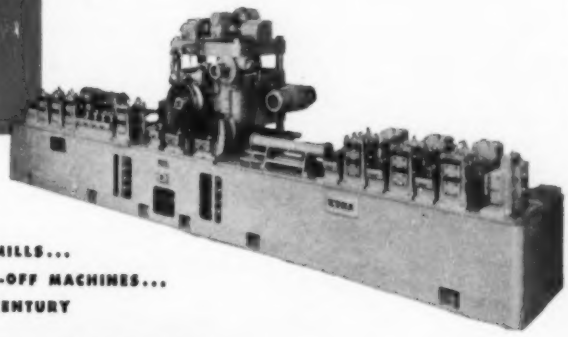
The New **Aero Willys....** *and the Mighty* **Jeep..**



MILE AFTER MILE OF STEEL TUBING IS REQUIRED

ETNA TUBE MILLS HELP DO THE JOB

Regardless of the type of tubing you require, there is an Etna Resistance-Weld Tube Mill suited to your requirements. Etna invites comparison of their mills with any other on the market. For faster, more uniform production of steel tubing, regardless of finish or end use, consult Etna engineers. Etna mills are designed to meet your individual requirements.

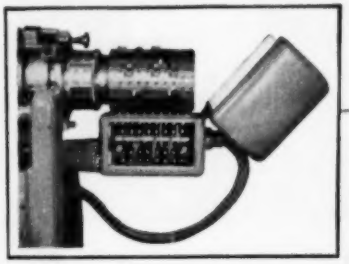


MANUFACTURERS OF HEAVY DUTY TUBE MILLS... SWAGING MACHINES...TUBE CUT-OFF MACHINES... FOR MORE THAN HALF A CENTURY

THE ETNA MACHINE CO.

3400 MAPLEWOOD AVE. TOLEDO 10, OHIO

You'd have to see the Gildematik 16-station Turret Lathe in action to believe all it does!



Speeds, feeds and direction of rotation for each of the 16 tool positions on Gildematik vertical drum-type turret can be *preset* in automatic cycling sequence by trip dogs on protruding end of turret. On indexing from one tool hole to next, trip dogs actuate electrical servo units, which pass on impulses to hydraulic controls. Speeds, feeds and direction are shifted instantaneously. *Right*: Gildematik RV 50 on the job at Special Screw Products Co., Bedford, Ohio.

Drum-type turret has electro-hydraulic preselection of feeds and speeds

Just imagine these operating features on your production line:

16 tool positions to carry bar through complete machining cycle to fine finished part—no secondary operations. Cuts machining time up to 50% on small work.

Automatic cycling by simple preselector controls! Electro-hydraulic servo units engage preset speed (from 11-2000 rpm), feed and direction of rotation for each tool...in fraction of a second.

Economical production even on runs of 20 pieces or less.

Quick, easy changeover from automatic to manual operation—without resetting automatic controls. Under manual control, speed and feed for next operation can be preselected while one operation is in progress.

Turret can be swung around on its own axis for facing, forming, plunge cutting and cutoff operations.

Tolerances within ± .0004" to ± .0008" on production runs.

Easy maintenance...gears and hydraulics can be moved out of machine as a unit and be replaced in 15 minutes. Extra gear boxes carried in stock in Cleveland.

Yes, the Gildematik is an amazing machine. Those who saw it—and bought it—at the Tool Show all agree. So will you when this high-speed performer goes to work in your plant. Don't delay getting the whole Gildematik story—write today.

The Special Screw Products Co. bought a Gildematik on sight and got these results:

Says Mr. D. M. Douglas, Plant Manager:

1 SET-UP INSTEAD OF 2

"Machining male and female pipe tees and ells from stainless steel forgings required two set-ups on a conventional turret lathe. With the 16 tool positions on the Gildematik we turn out finished fittings with *one* set-up."

ELIMINATED SECOND OPERATION

"Machining the recess on another part after drilling and tapping previously called for a second operation. With the duplicating attachments on the Gildematik, we machine the recess with a point turning tool, without chatter, and eliminate the second operation."

If you're coming to the 2nd European Machine Tool Exhibition at Hanover, Germany, September 14-23, visit the Gildemeister exhibit—see the Gildematik Turret Lathe and other advanced-design equipment in operation.

Replacement parts in stock at our Cleveland Service Center

KO INDUSTRIAL IMPORTERS

KURT ORBAN COMPANY, INC.

205 East 42nd St., New York 17 • 4220 Prospect Ave., Cleveland 3 • 19450 James Couzens Highway, Detroit 35

REGULAR TAPS — SPECIAL TAPS, big ones — little ones, precision ground thread — carbon cut thread, specially heat treated — chrome plated, that's the GTD GREENFIELD LINE.

At "Greenfield" no tapping job is too small, no tapping job is too large, we welcome them all. Go for the **complete** tap line. Go for GTD GREENFIELD.

GREENFIELD TAP and DIE CORPORATION

GREENFIELD, MASSACHUSETTS

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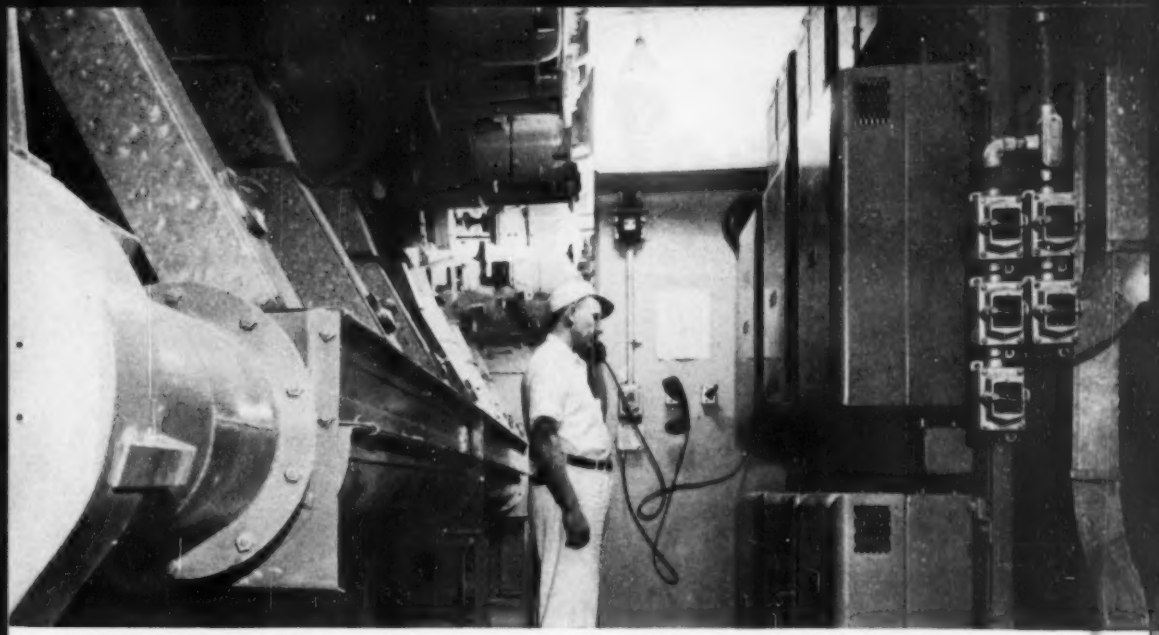
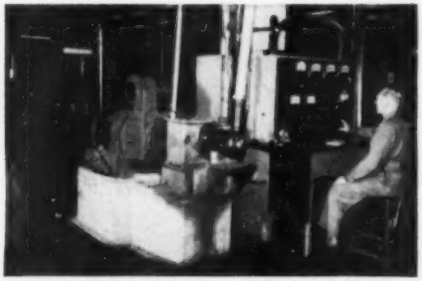
NO. 503
JOBBER
HIGH SPEED
STRAIGHT SHAN
1/2"
1/2"
1/2"
1/2"



GENERAL MILLS, INC. picked G-E *Thy-mo-trol*® drives to proportion and control flow rate of flour. They wanted stepless, very accurate, electronic speed control over a wide range, plus quick, easy operation. The answer: *Thy-mo-trol*, available in ranges to 100:1 and more, ¼ h.p. and up. Above, operator gets orders over phone, sets drive speed quickly by turning dial.

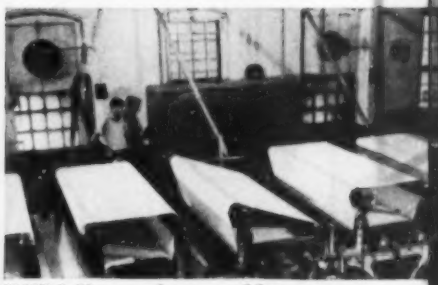
Why four plants chose four different G-E Adjustable-Speed Drives!



JACK & HEINTZ, INC. chose G-E *Speed Variators* because they wanted to increase production with rotating, adjustable-speed drive that could be operated from centralized control—still maintain good quality over a wide speed range.

◀**BUTTERICK CO. INC.** found G-E *ACA Motors* ideal for varying speeds over moderate range for offset presses. Here is the simplest, low-cost way to get stepless, adjustable-speed drive with a-c power, contains motor, control in one compact unit.

*Reg. Trade-mark of General Electric Co.



CRANE & CO., manufacturers of fine paper, selected G-E *Electronic Speed Variators* for paper machines—needed a 40 h.p. adjustable-speed drive that maintained rigid quality control, automatically, 24 hours a day, six days a week.

GENERAL ELECTRIC CO. is the only manufacturer making *all major types* of electric adjustable-speed drives to help you speed output, raise quality. Write for 24-page *Bulletin GEA-5334. General Electric Co., Schenectady 5, N. Y.* 646-18

GENERAL ELECTRIC

General Purpose

Only CARBO TRADE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

Wheels . . .

General Purpose Wheels by CARBORUNDUM give you the widest possible range of abrasive tool versatility. Furnished in standard sizes for every known make of grinding machine, they improve the quality and quantity of work from veteran and inexperienced operators alike. In the cool cutting, long lasting V30 bond developed especially for general purpose work, "ALOXITE" aluminum oxide wheels are outstanding performers. They give you the ideal combination of abrasive grain, bond, grade and structure which provide highest grinding performance at lowest total cost.

ORDER FROM YOUR CARBORUNDUM DISTRIBUTOR TODAY. He's your best bet for complete stocks, prompt delivery, experienced counsel on latest developments in the field. You'll find him listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!

This "tell-all" booklet is FREE!

THE CARBORUNDUM COMPANY, Dept. AM 81-81
Niagara Falls, New York

Please send me, FREE, your booklet, "Causes and Correction of Common Grinding Errors."

NAME AND TITLE

COMPANY

STREET AND NUMBER

CITY ZONE STATE

RUNDUM

MARK

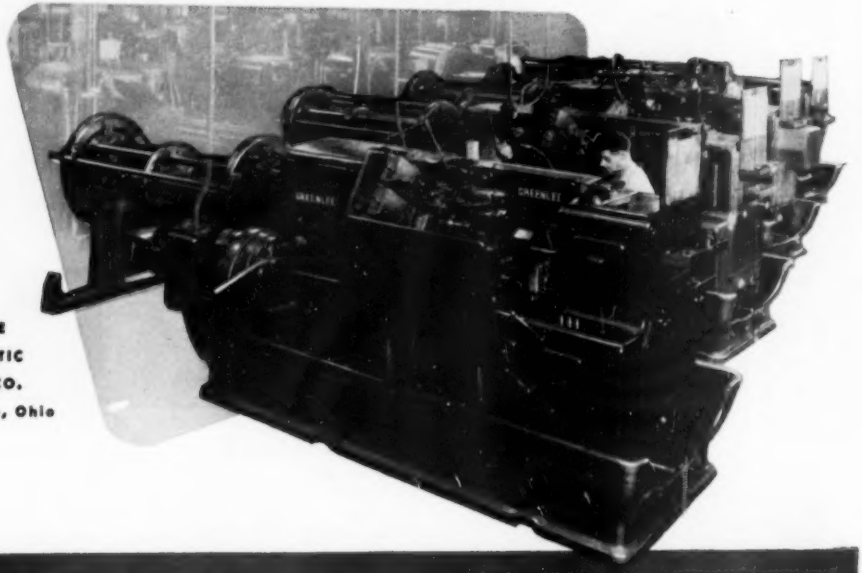
offers ALL abrasive products...to give you the proper ONE

81-81

FEATURING

Versatility and Quick Change-Over

ON A WIDE RANGE OF WORK...



DEFIANCE
AUTOMATIC
SCREW CO.
Defiance, Ohio

GREENLEE *Automatics*

When our reporter visited the busy shop shown above, he found that the battery of four GREENLEES was used mostly in making parts for DAS Unions — a specialty product of the concern. These unions are low-cost pipe fittings, featuring a pressed-insert bronze seat, that will hold pressures up to 300 psi for steam and 750 psi for water. (This high capacity permits distributors to minimize their number of items for a wide range of requirements.) The concern also does a great deal of jobbing work, much of which is now "classified". Owners and operators alike expressed their satisfaction with GREENLEE machines and service, also indicating the GREENLEES are "easier to work on". With their quick change-over features, the GREENLEES are an important factor in holding down costs on the component parts required for the DAS Union line.

Production-line tooling data for the seat end of a ¾" DAS Union, as run on a 1⅝" Greenlee Six-Spindle Automatic, is as follows:

Position	Cross Slides	Main Tool Slide
1	Rough Form	Form Drill 1 1/16" dia.
2	Finish Form	Drill ⅞" dia.
3	Knurl	Form Ream
4	———	Thread 1⅛" OD
5	Break down part way for cut-off	Tap ¾" pipe thread
6	Cut off	———

Cycle Time — 14 sec. Production — 257 pcs. per hr.

GREENLEE BROS. & CO.

1728 MASON AVE., ROCKFORD, ILLINOIS

PRODUCTION MACHINERY
GREENLEE

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

Smith & Mills PATENTED

SOLID RAM

PACKS THE PUNCH

..to "rough" with ease

..to finish with precision

..to speed your production

..to please your operators

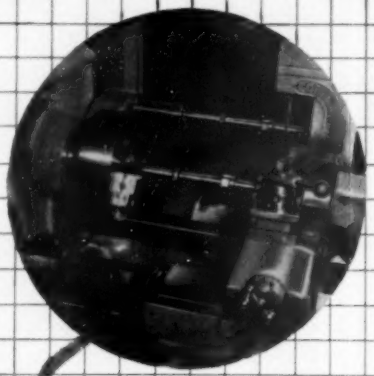
This exclusive Smith & Mills Solid Ram is only one of the recent progressive engineering developments which have made both management and operators prefer Smith & Mills Shapers . . . **just as they have for 64 years.**

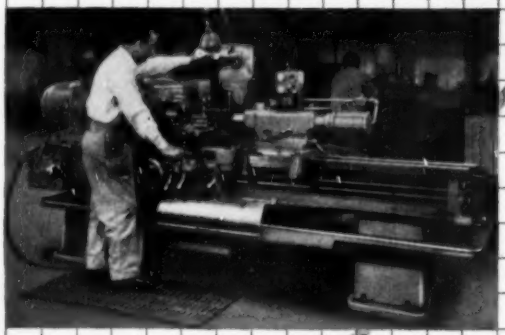
The Smith & Mills COMPANY
affiliated with Bryant Machinery & Engineering Company
General Offices: 400 West Madison Street, Chicago 6
EXCLUSIVE REPRESENTATIVES THROUGHOUT THE WORLD

Fine Shapers since 1888

(Oil equipment manufacturer reports)

production increased at least 60%





with Lodge & Shipley copymatic

COPYMATIC form turning various oil well equipment items at Otis Engineering Corp., manufacturing affiliate of well-known Otis Pressure Control, Inc., Dallas, Texas.

In the production of sub-surface controls which must be placed and operate in oil well casings far underground, the precision and speed of the Lodge & Shipley COPYMATIC Lathe are valuable assets. This manufacturer says, "tolerances can be held closer . . . the COPYMATIC can be used as tracer type or conventional lathe . . . is very easy to operate."

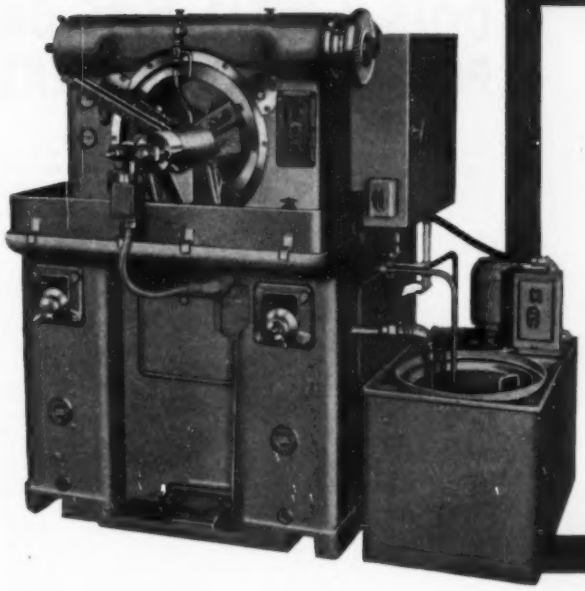
On a typical job, 303 Stainless is turned for O.D. and taper at 549 RPM and .0067" feed, using Kennametal K3H tools. On this and other jobs involving form boring and threading, the user "has been very successful in decreasing production costs over the use of conventional lathes."

In any size shop . . . on a multitude of operations . . . the speed and versatility of the COPYMATIC, coupled with the accuracy of the Lodge & Shipley Model X Lathe, turns out more work at lower cost. For additional case histories, complete details, write:

THE Lodge & Shipley COMPANY
3059 Colerain Avenue
CINCINNATI 25, OHIO

FOR SMOOTH THREADS...*FAST!*

you'll save materials... and man power



...with the

NAMCO

Triple Roll Hydraulic Thread and Form Rolling Machine

with Magazine Feed and Hydraulic Loader

This precision high-production machine is the perfect answer for makers of instrument, aeroplane or automotive dry-seal parts for the defense program. Thread lengths greater than twice the diameter can be produced smoother, faster—and with a greater saving in materials and man-hours than by any other method.

The Namco Thread-Roller operates on either the plunge-cut or the feed-through principle, with interchangeable two-roll or three-roll heads and straight-line support. Class 3 fit and unsurpassed finish (superior to ground-thread production) are characteristic.

Capacities range from $\frac{3}{16}$" up to $1\frac{1}{2}$" using three rolls—and $\frac{1}{8}$" to $\frac{3}{8}$" using two rolls. Because of its three-roll operation and three-point support, which eliminates distortion, the machine is a "natural" for hollow work.

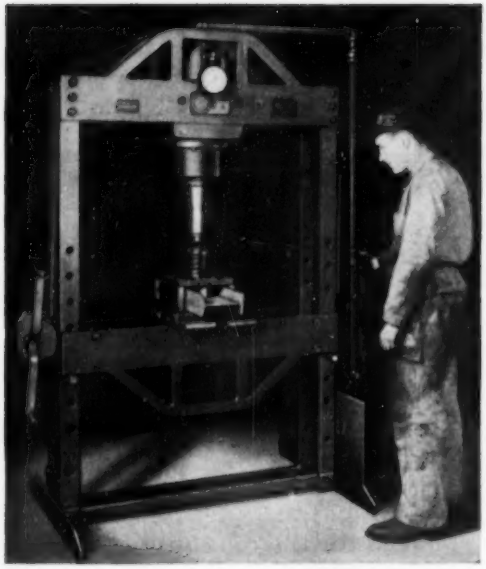
To save additional man-hours and permit the use of unskilled labor, magazine feed and hydraulic loader are available. This combination makes the Namco Thread-Roller the fastest, most versatile, most accurate, *most economical* means of thread production available today. Send us samples of the jobs you want to do; we'll do the rest—in quoting you on your requirements.

Ask us for your copy of this twelve page bulletin (TR 49) giving complete details on the Namco Thread-Roller.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



KRW HYDRAULIC PRESS DOES 4 VITAL JOBS ON POLE-SETTING DERRICKS

BATAVIA METAL CORP. bought a K. R. Wilson 75 ton motor-driven Hydraulic Press two years ago to perform a few routine operations on their pole-setting derricks (derrick shown on telephone truck below). But they soon found that the amazing versatility of the press—the ease and speed with which it can be converted from one set-up to another, makes it a natural for all kinds of trouble shooting. Below are just a few of the jobs their KRW press does.

1. SETTING RIVETS in side legs and front braces of pole-setting derricks. Thanks to their KRW press, Batavia Metal has eliminated loosening of rivets and the resulting loss of valuable production time.

2. COSTS CUT 33⅓ % The center hole on derrick foot plates must be 1½" in diameter, flanked by two 11/16" holes. Originally the company drilled three 11/16" holes on a small drill press, then moved the plates to the machine shop where the center eye-bolt hole was reamed out to 1½" diameter. Use of a simple die plus the KRW press produces all three holes in one stroke and eliminates the drilling and reaming operations, cutting costs by more than ⅓.

3. FORMING BRACKET U'S for derrick mountings on front of trucks and riveting the lower sections of front mountings are two more jobs done quickly, accurately and efficiently on the KRW Hydraulic Press.

4. FORMING BASES for ratchet jacks and restoring proper contour to various castings which sometimes warp as they cool are also regular assignments for this KRW press. Company officials tell us that their KRW Hydraulic press is in use the greater part of every working day!

Any pressing problems in your plant? Check with K. R. Wilson for the right press to do the job. KRW Hydraulic Presses come in one, two and three cylinder models; 25 to 150 ton capacities; hand operated, air operated or motor driven. For facts and prices contact your machinery dealer or write, wire or phone Dep't. 11.

***IMMEDIATE DELIVERY** on type of press shown above up to 75 ton capacity, hand, air or motor driven.*

K. R. WILSON

215 MAIN STREET BUFFALO 3, N. Y.

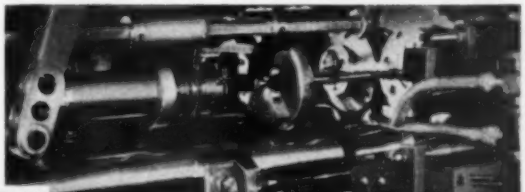
DESIGNERS AND BUILDERS OF HYDRAULIC PRESSES TO SOLVE ANY METALWORKING PROBLEMS

Although certain types of shaft jobs offer natural opportunity as bar machine work, with the exception of the CONOMATIC, seldom do they appear on multiple spindle bar automatics. In general, shaft jobs require a longer tooling area than do other types of bar work.

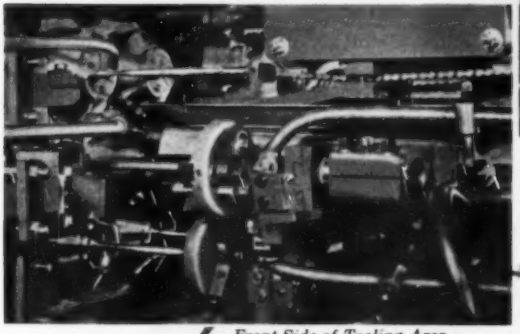
A glance at the frame design of the CONOMATIC explains why its tooling area is longer* than the tooling areas of other "automatics." And there are more tool positions* and more room* for tool setting for *any* type of job.

*You can have the figures

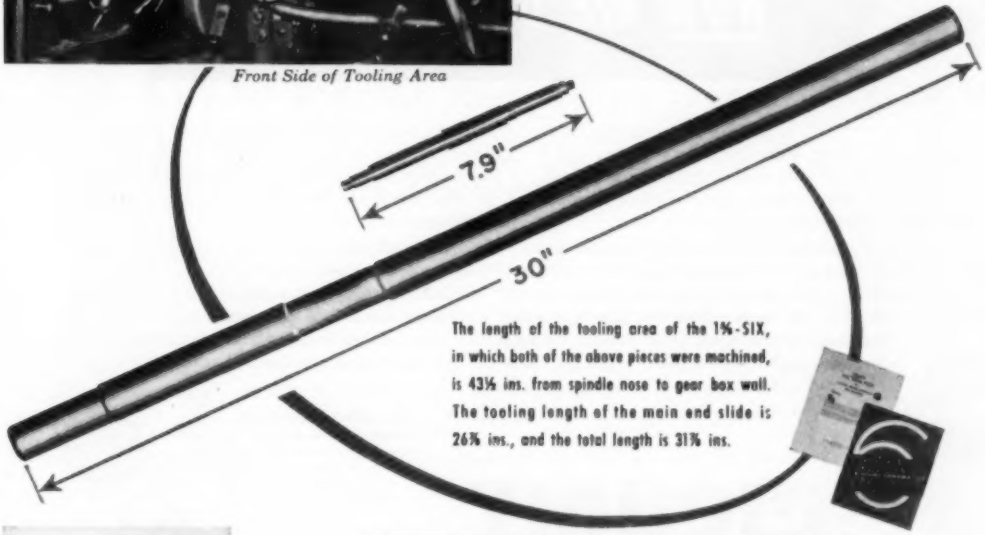
THERE'S *More* THAN JUST *"Elbow Room"*



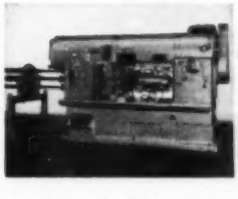
Rear Side of Tooling Area



Front Side of Tooling Area

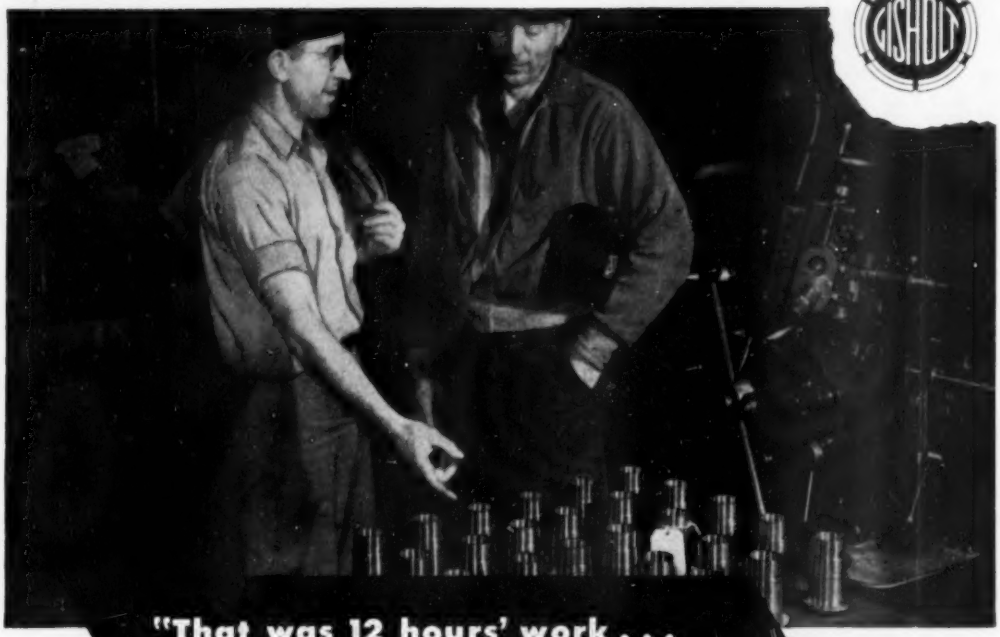


The length of the tooling area of the 1⅛-SIX, in which both of the above pieces were machined, is 43½ ins. from spindle nose to gear box wall. The tooling length of the main end slide is 26⅝ ins., and the total length is 31⅞ ins.



A Comparison of ALL Automatics is in favor of Cone

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



"That was 12 hours' work . . .
NOW WE DO IT IN 8!"

Yes, the operators who've struggled along with older turret lathes will tell you: A 50% increase in production is not unusual when you replace with new Gisholt Ram Type machines.

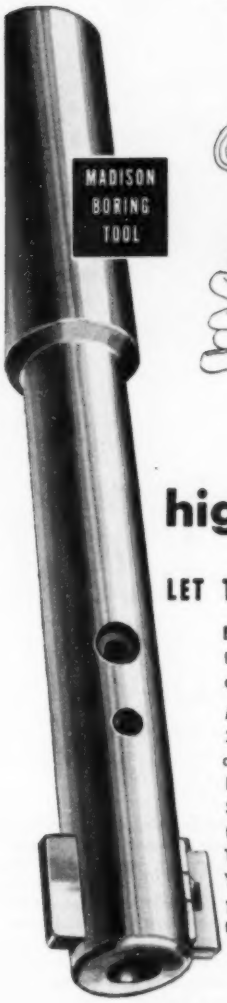
Many of the old manually operated functions have now become automatic. They're so much simpler and easier to run that you can't help but get more efficiency. Selective automatic speed changing gives instant changes between high and low spindle speeds. There's hydraulic clutching and braking—no effort. Automatic indexing and clamping of the hexagon turret saves more time. These are a few of the modern features that give you the smooth production rhythm that insures higher overall efficiency.

Add to these the power and rigidity to take multiple cuts and you have the unbeatable combination that means bigger production and lower costs. It's the performance that will "buy off" your older machines. Replace with modern Gisholt Turret Lathes.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



high boring costs make you blue?

LET THE MAN WITH HOLES IN HIS HEAD LOWER THEM FOR YOU

Every Madison cutter, and bar, no matter what its size, is designed to do your boring operations faster at lower cost. With Madison cutters and bars you never get those high-boring-cost-blues.

Madison *cutters* range in diameter from ⅝" to any desired size. Madison *bars* range from 2½" to fourteen feet in length . . . or longer. The secret of Madison's ability to cut costs is Madison's exclusive cutter and bar design. First, there is Madison's two bladed cutter. It provides generous chip clearance . . . permits faster cutting without overheating. Second, is Madison's exclusive float design. Cutters float in Madison bars, special floating tool holders are never needed . . . both edges of the cutter take an equal bite. That means more holes per cutter, longer cutter life with fewer regrinds. You get these features, plus many other Madison advantages, when you ask the "Men With Holes in Their Heads" to cut your boring costs. Write today. A brief letter will do.

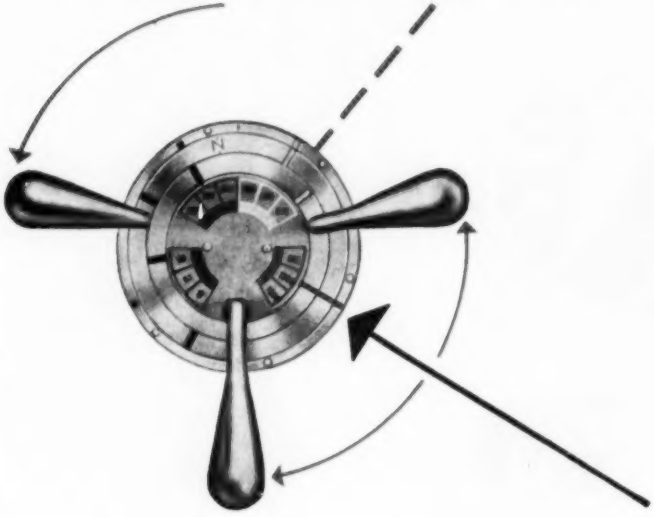
Write for the information filled Madison catalog: It is yours for the asking.

Tools for rough boring; finish boring; combination rough and finish boring, multiple cutting, bottoming; and other special tools.

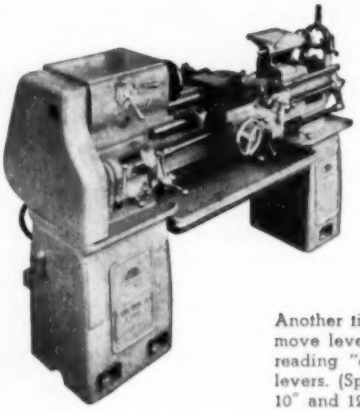
MADISON MANUFACTURING CO.

DEPT. AM **MUSKEGON, MICHIGAN**

can you top this pick speed



match color



Another time-saving, production-boosting **plus** in Tray-Top Cintilathes. You simply move levers so the colored lines point to the desired speed marked on the direct reading "color match" dial. No more cross reference between index plate and levers. (Speed shown is 1263 rpm.) All geared head gives you 12 spindle speeds. 10" and 12½" swing sizes, standard range — 30 to 1200 rpm (optional range — 45 to 1800 rpm), 15" and 18" swing sizes, standard range — 20 to 820 rpm (optional range — 30 to 1200 rpm). 40 to 1 overall ratio. Totally enclosed quick-change gear box provides 48 thread and feed changes, and reverse for leadscrew. In less than 15 minutes Tray-Tops with an English leadscrew can be changed to cut a full series of metric threads using the quick-change box in the normal manner. These are just a few extra values Tray-Tops offer at economy prices. Swing sizes: 10", 12½", 15", and 18". Catalog on request.

CINTILATHE

CINCINNATI 9, OHIO, U.S.A. **cincinnati lathe & tool co.**

How the Fable of

"The Birds, The Beasts & The Bat"

has a parallel in Cutting Fluids

. . . thanks to Aesop for this Fable

The Birds were engaged in a fierce battle with the Beasts. The Bat figured he could pass as either a Bird or a Beast and he wanted to be on the winning side. As the battle see-sawed he flitted back and forth. The Birds finally won but the Bat got back to their side too late and was chased away to a cave, where he has lived ever since, ashamed to come out except at night.

The Parallel . . .

Like the Bat in the fable, some cutting fluids appear to be both Bird and Beast, but may be neither. If you are going to tap a tough, difficult to machine metal you need a heavy duty cutting oil with high *anti-weld* and good *lubricity* characteristics. On a less exacting light milling job a conventional water-mix fluid with good temperature regulating properties is usually the answer.

The point the fable emphasizes is that a cutting fluid can't be on both sides of the fence. You don't need a different fluid for every job but you need one that's *right* for the job. Stuart products and Stuart experience will give you the best possible results in terms of finish, tool life and production. Ask to have this demonstrated to you by a Stuart Representative.

More Than a "Coolant" is Needed

D. A. Stuart Oil Co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2729 S. Troy St., Chicago 23, Ill.

SEND FOR BOOKLET entitled *More Than a "Coolant" is Needed*

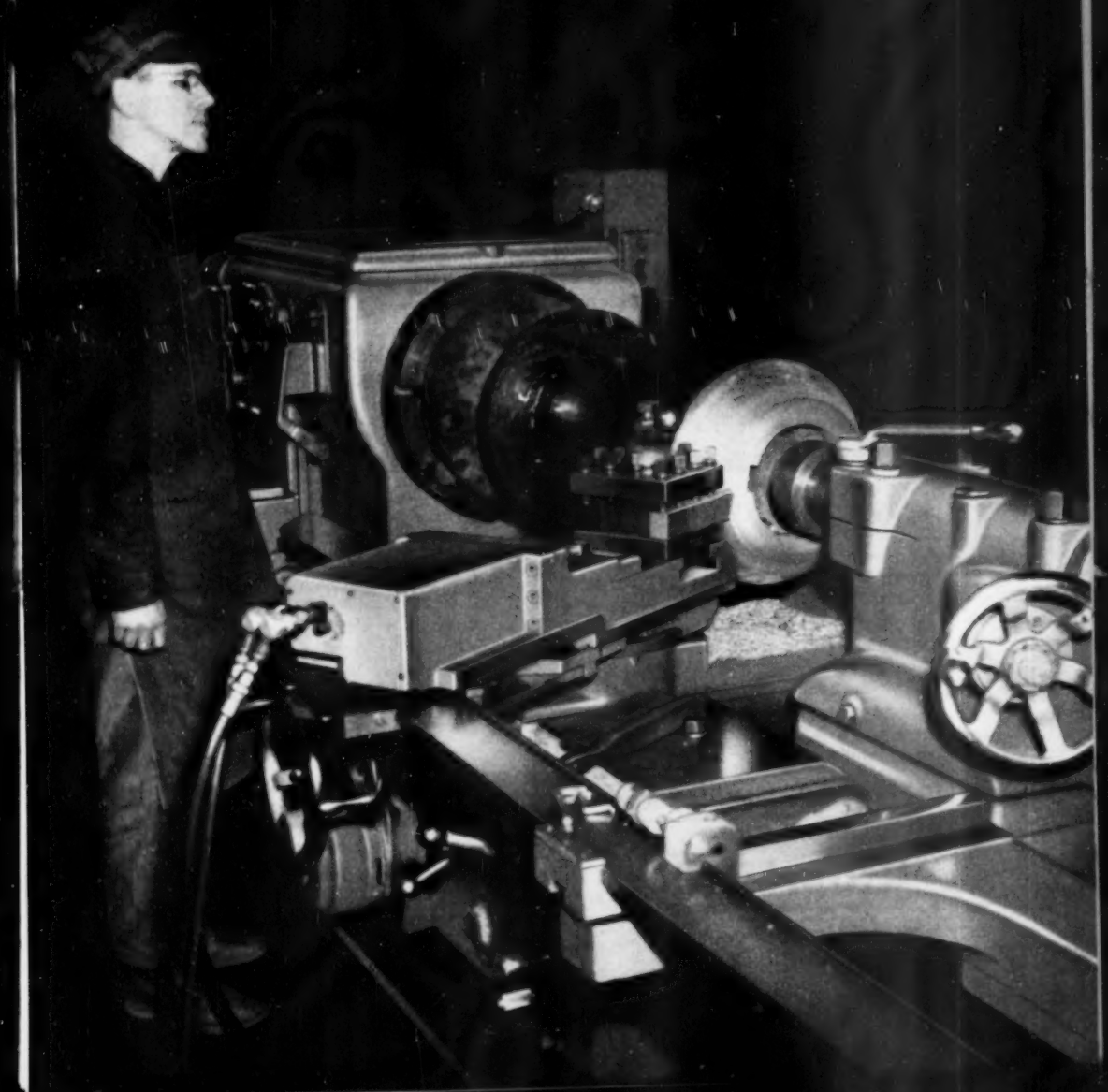
CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

to D. A. Stuart Oil Co., Ltd., 2729 S. Troy St., Chicago 23, Ill.

Your Name .....

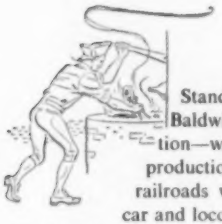
Title .....

contouring time cut 58½%



with LeBlond Hydra-Trace

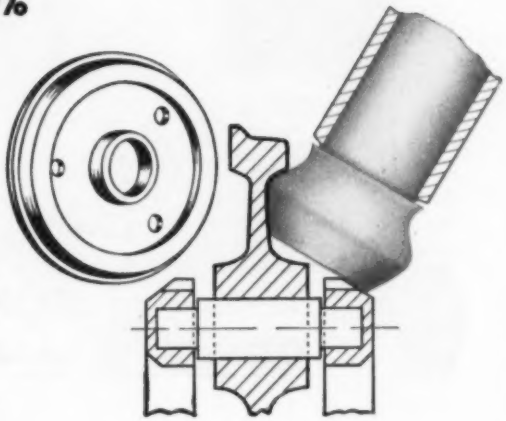
wheel mill roll life boosted 50%



Standard Steel Works Division of Baldwin-Lima-Hamilton Corporation—whose forges first flamed into production in 1795—supplies America's railroads with one-piece, wrought steel car and locomotive wheels. And Standard Steel officials credit LeBlond Hydra-Trace for contributing to their outstanding success in producing these wheels at competitive cost in the quantities needed.

At Standard's Burnham, Pennsylvania Works, rolls of alloy steel are turned to contour and then put to work shaping wheels. The intense pressure and heat of this hot-rolling operation soon work-hardens and wears the rolls out of contour. Formerly a skilled operator—tediously matching contours with a hand-held template—redressed the rolls manually. Four dressings were considered long service for a roll . . . and the work-hardened surface quickly dulled carbide turning tools.

Now, with Hydra-Trace installed on a 25" LeBlond Heavy Duty Lathe, Standard Steel chalks up big savings under all three headings—man hours, material and tool life. As Marty Gotwalt of Swind Machinery—LeBlond's Philadelphia distributor—puts it, "Hydra-Trace automatically keeps the tool just under the work-hardened skin. We've lopped 14 hours off what used to be a 24 hour job."



And that's not all. Minimum metal-removal by the Hydra-Trace method frequently saves Standard's wheel mill rolls for six dressings—*a bonus of two over the manual method.*

Whether your turning problems—like the wheel mill rolls at Standard Steel—center in the toolroom or demand stepped-up output on the production line, Hydra-Trace is ready to help. For all LeBlond Heavy Duty Lathes built since 1935, this template-controlled, hydraulically powered tracer can be mounted in minutes. Templates are flat, compact, and suitable for both rough and finish turning. Call your LeBlond distributor or write

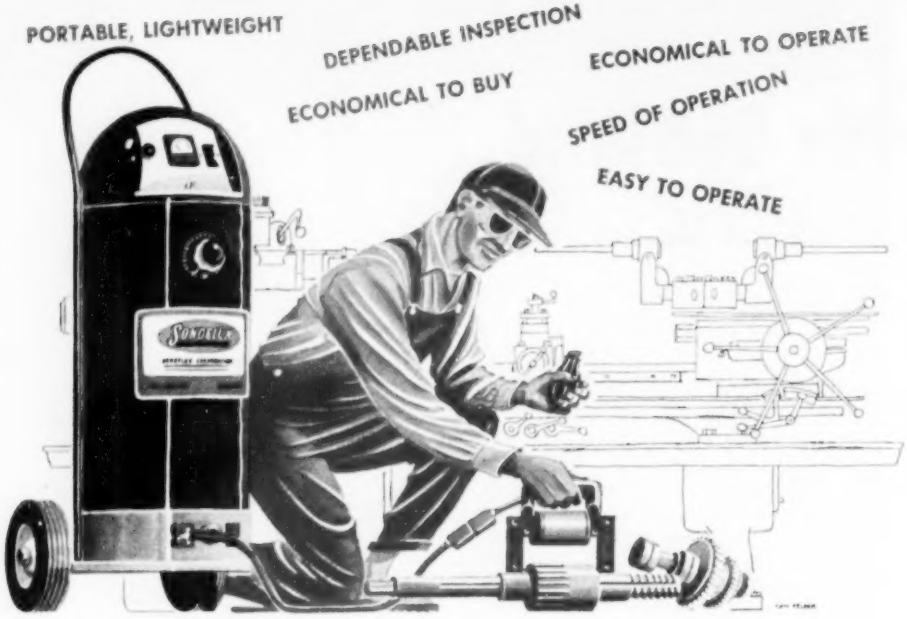
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin HT2A for complete details on LeBlond Hydra-Trace

turned faster by

LEBLOND *of Cincinnati*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 64 YEARS*



SONOFLUX MAGNETIC PARTICLE INSPECTION

prevents costly breakdowns —
cuts finished parts rejects —

The dual purpose SONOFLUX Inspection Instrument earns its keep both as a production *and* as a maintenance inspection tool. Spotting cracks and flaws before finish machining. Keeping machines and equipment running by periodic magnetic particle inspection of critical parts. This portable, lightweight unit, which can go anywhere in your plant, is an accurate and dependable inspection instrument.

Write for the complete story on the Model 3 Sonoflux Vibro-Magnetic Inspection Instrument or request a demonstration at your plant.

SONOFLUX

Trademark Registered
U. S. Patent Office

SONOFLUX CORPORATION

P. O. Box 6644 **Houston 5, Texas**

A G. S. CUSTOMER* WRITES: "*.. how pleased we have always been with all our dealings with Gear Specialties.*"
*NAME ON REQUEST

Get Smoother, Quieter, Longer-Lived Fractional Horsepower Gearing!

Most of the Small Gearing we make goes to customers we've served for *years!* Sure, we keep adding new accounts, but before long they, too, join the list of old-timers. Steady repeat business is a sure sign of satisfied customers. Our Gears just *have* to be better.. they *must* run longer, and smoother, and quieter, to win such lasting loyalty. ★ During the past thirty-six years, we've never swerved from the single purpose of making Fractional Horsepower Gearing *exclusively!* And we've never relaxed in our efforts to mass-produce them quicker, more efficiently and economically. This devotion to *consistently* doing ONE job superlatively well has helped us gain the enviable position of "WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING"! ★ Chances are G.S. Small Gearing would improve *your product too!* Our experienced engineers will gladly help you design or determine the best and most economical Small Gearing for *your* needs. Call us in at the drawing board stage. Suggestions, ideas, and cost estimates incur no obligation. Write or phone us TODAY!

SEND FOR.. the G.S. 6-page illustrated folder. It describes and illustrates G.S. facilities, Small Gearing and applications, together with handy charts. Will you ask for it on company stationery, please? No obligation, of course.

GEAR Specialties, Inc.

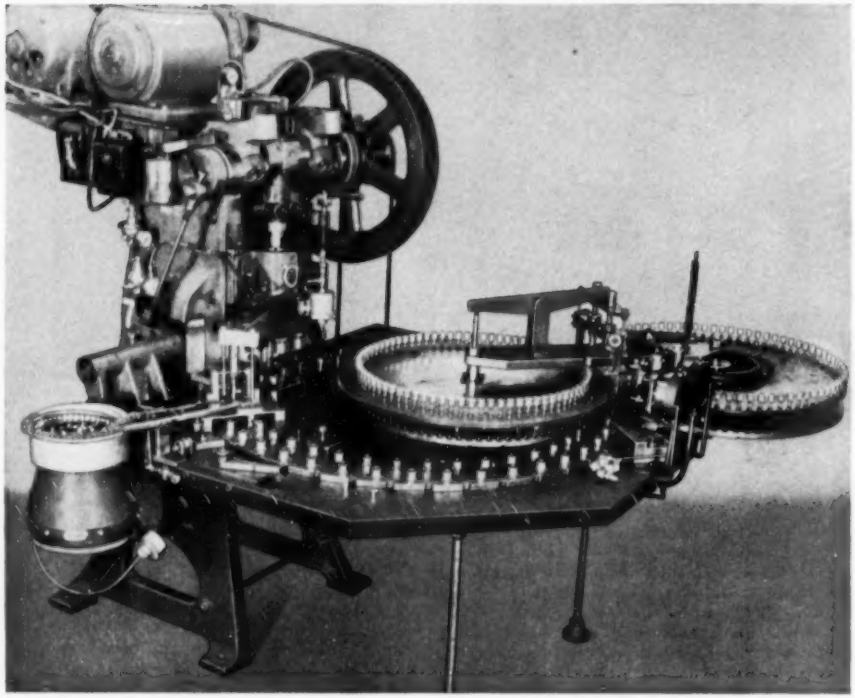
Spurs · Spirals · Helicals · Bevels · Internals · Worm Gearing · Racks · Thread Grinding

2635 WEST MEDILL AVENUE · CHICAGO 47, ILLINOIS

MEMBER OF AGMA

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

How V&O is Helping *modernize power press*



V&O Dial Feed Produces Batteries For P. R. Mallory

All of the operations involved in assembling small batteries are performed on this V & O Dial Feed, including application of hermetic sealing compounds. Affording a compact and integrated method of production, this Dial Feed is an example of the advanced type of power press tooling V & O is equipped to engineer and build.

V & O Dial Feeds may provide just the techniques you need to improve metal stamping or parts assembly operations. It will pay you to investigate what these feeds can do to save motion and space . . . combine assembly operations, overcome shortages of skilled personnel and reduce costs of small parts manufacture.

OTHER EMHART PRODUCTS INCLUDE:

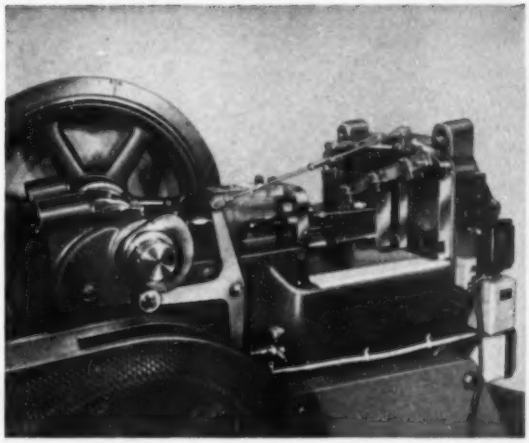
HIGH SPEED AUTOMATIC PRESSES
HENRY & WRIGHT
Division of Emhart Mfg. Co.
HARTFORD 5, CONNECTICUT

GLASS MAKING MACHINES
HARTFORD-EMPIRE CO.
Division of Emhart Mfg. Co.
HARTFORD 2, CONNECTICUT

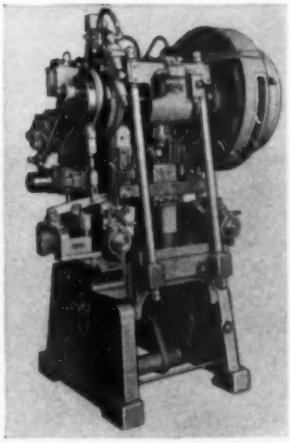
AUTOMATIC PACKAGING EQUIPMENT
STANDARD-KNAPP
Division of Emhart Mfg. Co.
PORTLAND, CONNECTICUT

PLASTIC BOTTLES, RODS, TUBES, SPECIAL SHAPES
PLAX CORPORATION
Subsidiary of Emhart Mfg. Co.
HARTFORD 1, CONNECTICUT

Leading Companies *operations*



On Its Back, this V & O press provides a "cushioned" method of sizing sintered bronze bushings, avoiding the hazards normal press operation would present for a part of this type. It is easier to get parts in and out of the press.



New High Speed Press, latest in V & O line, features maximum rigidity and minimum vibration. It is designed specifically to meet today's need for precision metal stamping at highest speeds.

Production Increases in secondary dicing operations, ranging from 28% to 500%, are reported by companies employing the V & O Feed-O-Matic® — the mechanical punch press feeder that lengthens die life, simplifies operator motions and improves safety.

Only the best is good enough

DESCRIPTIVE CATALOGS Catalogs containing complete specifications and operating details on V & O Precision Power Presses and Feeds are available. Please write The V & O Press Company, 301 Union Turnpike, Hudson, N. Y.

THE V & O PRESS COMPANY

Division of Emhart Mfg. Co.

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

HUDSON **NEW YORK**

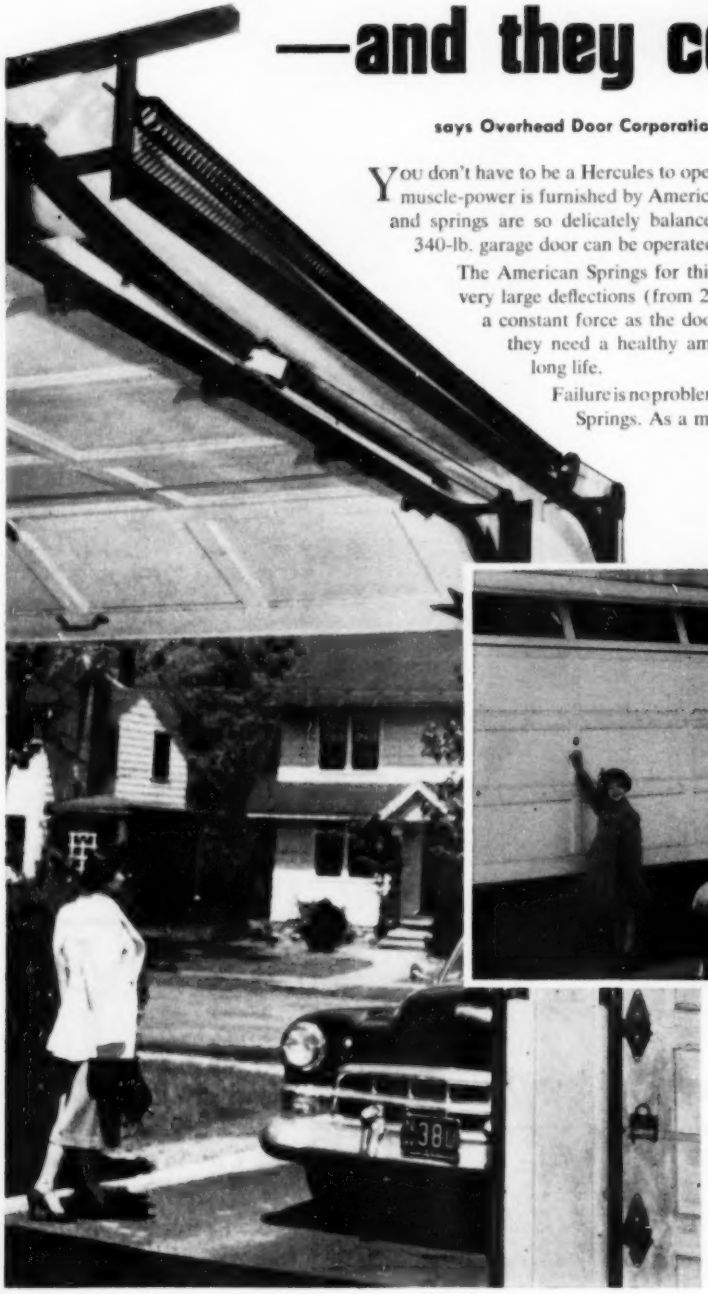
"These American Springs are better —and they cost less"

says Overhead Door Corporation

You don't have to be a Hercules to open these doors, because all the muscle-power is furnished by American Quality Springs. The door and springs are so delicately balanced that the massive 16-foot, 340-lb. garage door can be operated easily.

The American Springs for this application must withstand very large deflections (from 27" to 48"). They must exert a constant force as the door is raised and lowered; and they need a healthy amount of reserve strength for long life.

Failure is no problem with these American Quality Springs. As a matter of fact, Overhead Door



ANYBODY can open this 16-foot, 340-pound door. The American Quality Springs exert a constant pull, and allow effortless action.

AT TOP OF PHOTO, notice how far these American Quality Springs must deflect in the "OVERHEAD DOOR."

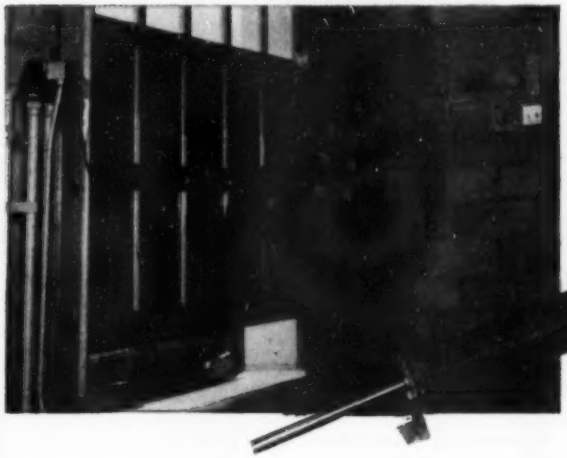
than counterweights

Corporation says, "We have been building doors for 32 years and practically all of those original doors still have their original springs."

The Overhead Door Corporation prefers a spring system (instead of counterweights) for two big reasons—and the most important one is cost. They get 500 pounds of pull from a spring at 25% less cost than if they used iron weights. Also, anyone who opens a spring-loaded door does not have to overcome the inertia of door plus weights. The door is practically weightless the instant you move it.

American Steel & Wire can produce and help you design a spring for just about any application, any size, any steel or finish. Let our skilled spring engineers show you how low in cost a truly superior spring can be. Call our nearest District Sales Office or write to American Steel & Wire Division, Rockefeller Building, Cleveland 13, Ohio.

OVERHEAD DOOR CORPORATION also makes many doors utilizing torsion springs. This spring is actually twisted around a shaft when it "winds up." Despite the high stresses, these American Quality Springs give trouble-free service.



"OVERHEAD DOORS" are widely used for industrial applications. Many of these industrial doors have been opened 100-150 times daily for *20 years* without a spring failure.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

U·S·S American Quality Springs

UNITED STATES STEEL

first & finest!

Jones & Lamson Radial Chaser Die Heads

GROUND with THREAD CHASERS

These Die Heads will do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme.

They are versatile tools with an over-all capacity of from No. 8 to 4¼".

They require no more than the proper chasers to cut either right- or left-hand threads. No extra equipment is needed.

They are easy to install and simple to handle. For almost half a century J&L Dies and Chasers have been the answer to a multitude of threading jobs throughout the world.

Look at these features that make them leaders in their field and give you better threads at lower cost:

STRENGTH

Every part is of solid steel, hardened and precision ground. There are no built-up sections. Dependability and ultimate capacity are assured.

FLOAT

All models are built with both concentric and longitudinal float.

DUAL-DIAMETER CONTROL LEVER FOR ROUGHING AND FINISHING CUTS

Heavy rough cuts, followed by light, accurate finish cuts can be taken with the same set of chasers by merely moving the roughing attachment lever. This is often a chaser saver on heavy, coarse pitch jobs, especially where short chamfers are a requirement.

SIZE ADJUSTMENT

The external micrometer adjusting screw provides simple and precise setting to exact pitch diameter. It is easy to set and maintain sizes well within your thread tolerances.

RAPID CHASER CHANGE-OVER

Chasers are removed for resharpening, or size replacement, by merely removing the front cover of the Die. No tools are required. Change-over is a matter of seconds — which means more hours available for production.

Write to Dept. 710 for illustrated catalog and complete information on these and Tangent Chaser Types and Dies for Brown & Sharpe machines.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

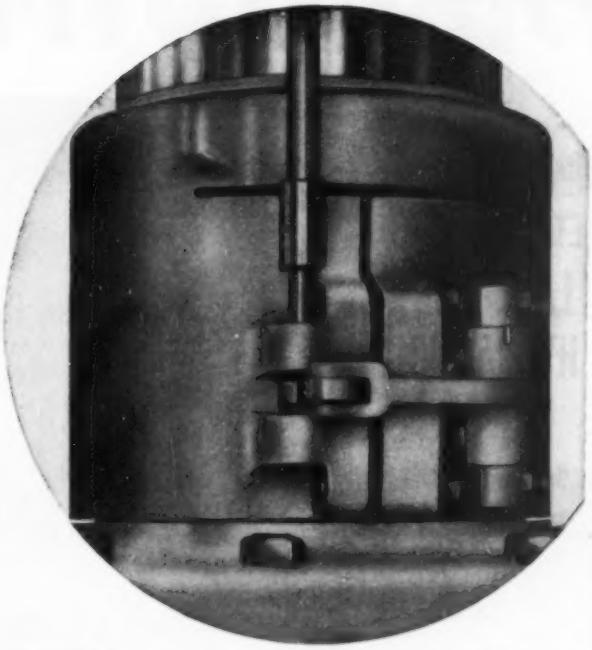
JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. J&L **DIE HEAD DIVISION**

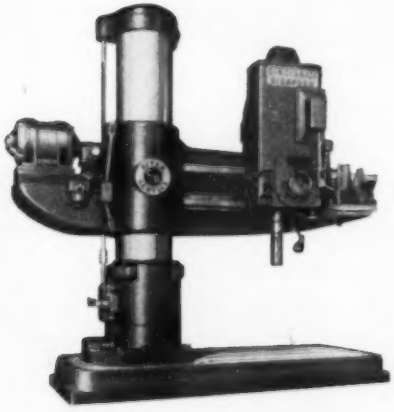
TRIED *and* TRUE

Now, powerful hydraulic arm and column clamping, operated by push buttons at the head, is standard, available on ALL Super Service Radials having column diameters from 11" to 26", inclusive.

This new feature on the smaller radial drills has been applied after many years of development plus 10 years of use on the large 22" and 26" diameter column machines which necessitate the most effective and powerful clamping that can be devised.

Step saving controls, all centralized on the SUPER SERVICE "clearview" head decrease machine handling time and increase accuracy and production.





Equal Efficiency of Every Unit Makes the Balanced Machine

Column clamping mechanisms are many and varied in design, but no other assures maximum power and effectiveness by providing;

1. The double draw bolt acting on hardened eccentrics.
2. Simple trouble proof hydaulically actuated clamp.
3. Push button controlled at the head on all of the SUPER SERVICE radial drills from the 11" diameter column to the 26" diameter column machines inclusive.
4. Uninterrupted column sleeve clamping surface is an integral part of the column sleeve, permitting stronger sleeve construction.
5. Stress proof column sleeve clamping area.
6. Less movement to the arm when clamp is actuated.

For further information on the distinctly superior engineering features of the SUPER SERVICE radial, write for booklet R-29 covering the 11" to 19" diameter column machines, and Booklet R-22 on the 22" and 26" diameter column machines.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

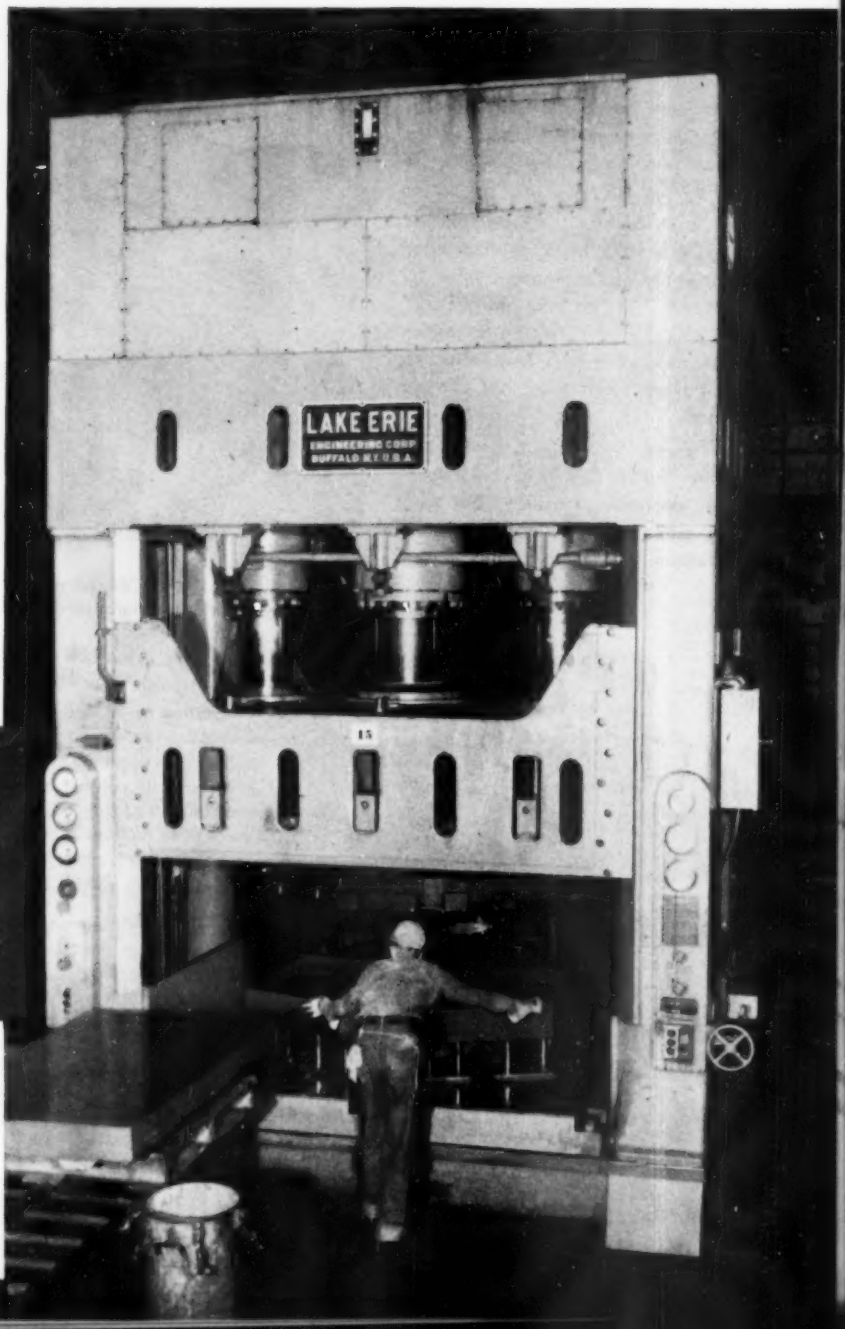
THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

The UCHTORFF

NEW 600 TON METAL DRAWING LAKE ERIE HYDRAULIC PRESS

in the Uchtorff plant

"We are proud of this press," says Mr. A. F. Uchtorff, president of the company. "Our customers and prospects are pleased too for now they have efficient metal forming facilities nearby for large pieces as well as the smaller ones formed on our original press. Our Lake Erie presses are saving time and money for our clients."



Repeat orders are the rule at Lake Erie

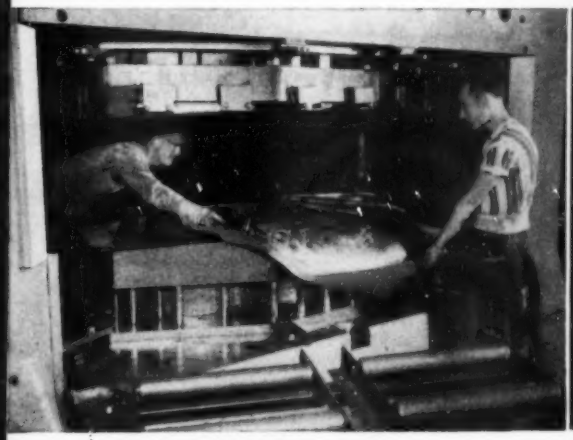
Being so satisfied with your first Lake Erie press that you soon want another is typical. It is the recorded experience of hundreds of leading plants...the best evidence in the world of the production improvements you can count on with Lake Erie hydraulic equipment.

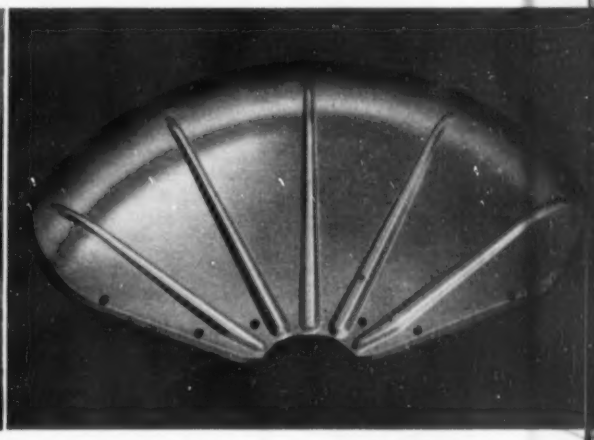
Success Story...

...another tribute to versatile

LAKE ERIE HYDRAULIC PRESSES

"Satisfy the customer's need," is the successful policy of The Uchtorff Company, Davenport, Iowa. In selecting Lake Erie Hydraulic Presses for their plant, Uchtorff acquired ideal equipment for this purpose. The first press quickly attracted and built-up a profitable volume of business. The second, and bigger press, is greatly expanding it in the farm implement, tractor and other fields requiring large drawn and formed parts. Versatile . . . fast . . . dependable . . . and efficient, Lake Erie Hydraulic Presses are "satisfying customer's needs" in hundreds of leading plants today. The newest presses are setting unmatched production records for a surprising variety of metal forming jobs. Why not ask us about these applications for your plant? Glad to have you. No obligation. Write or phone.





New 600 ton press with 200 ton hydro-pneumatic die cushion is shown forming hood wrapper for farm harvester. Piece is formed out of 22 gage deep draw steel and measures 34½" side to side by 48" top to bottom. Depth of draw is 5". Tonnages employed on this job are 400 on top platen and 100 on die cushion. Other typical parts formed on the Lake Erie presses are farm tractor fenders, farm tractor engine oil pans, farm plow depth gauge wheels and farm tractor engine valve covers. The unusual speed with which dies can be set up or changed is another important production advantage of Lake Erie hydraulic equipment.

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

General Offices and Plant:

507 Woodward Avenue, Buffalo 17, New York

LAKE ERIE HYDRAULIC PRESSES are available in any size . . . standard, modified and special designs—horizontal and vertical types—for Metal Working—Plastics Molding—Forging—Metal Extrusion—Processing—Vulcanizing—Laminating—Stereotype Molding—Die Casting—Briquetting—Baling—Special Purpose.

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LAKE ERIE ®

"Producing the very finest hydraulic machinery possible to help manufacturers produce more efficiently"

L & I Reamers have a Wider Range of Standard Sizes

Large Sizes
TO 1½"

Small Sizes
TO .040

The Reamer Specialists
LAVALLEE & IDE, INC.
CHICOPEE, MASS.

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Veep at Work

In reference to the article, "Plastics Equipment & Technique," by Denis A Dearle, (*AM*—April 28 '52 p107) I note that the title page carries a picture of our 8-D duplicator. The same illustration is also reproduced on page 115.

Ordinarily we would be quite gratified at having one of our machines so prominently displayed. However, the machine in question is a 1934 model, and was the first of a series of models of the Gorton Duplicator. It has been modified and redesigned several times since 1934.

A humorous fact about the picture is that the operator of the machine is now our vice-president in charge of manufacturing.

This is not written as a complaint, but rather as a suggestion that, in future articles, the author make sure that he has illustrations of current models, whether ours, or those of other machine builders.

Ira R Ogilvie
George Gorton Machine Co
Racine, Wis

We are sorry we did not spot the age of the machine in question, and regret exceedingly that we inadvertently demoted your vice-president. We have called the author's attention to the matter. However, we feel that there is a bright side to the error; it proves that progressive machine-tool builders believe in in-plant promotions, and that their working executives are men with real know-how.—Ed.

Broaching Correction

In my article "Drilling Holes for Rough Broaching" (*AM*—May 26 '52 p120) the drawing shows $\frac{R+r}{r^2}$, which actually should be $\frac{R+r}{\sqrt{2}}$. The formula in the text of the article is correct, but this change should be made on the sketch.

A Vetsch
Switzerland

Help Wanted

Referring to the letter by R A Hill in "Backlash" (*AM*—July 7 '52 p102) I, also, am interested in cost estimating — but on airframe assembly. I have read Nordhoff's MACHINE SHOP ESTIMATING, and he does not include this subject.

Could you advise me of any source

GRINETICS

BY D. G. SMITH

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WHO IS RESPONSIBLE

for the machine-tools in your shop?

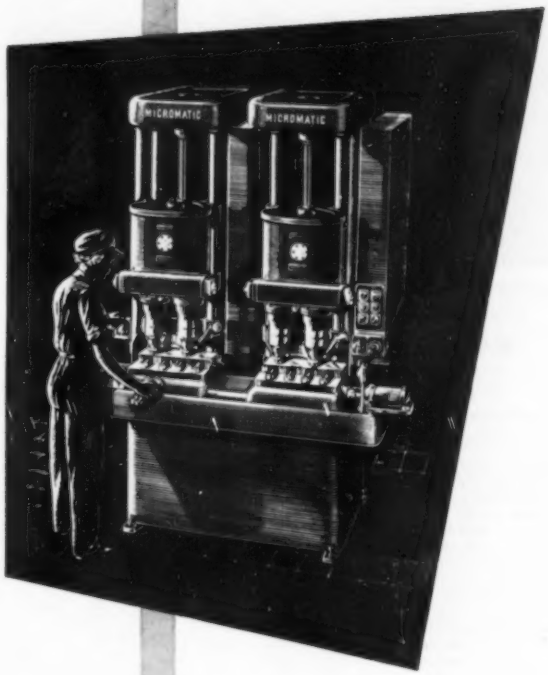
- **The dealer who sold them?**
- **The Engineering Company that designed them?**
- **The factory that built the machine, tool, or fixture?**

Where can you get complete service and satisfaction?

With users of Microhoning equipment there is no possibility of divided responsibility. One organization sells, engineers, builds, and services the complete installation. Micromatic is proud to assume full responsibility for all equipment and the results obtained with the Microhoning process.

As the leader in the development of the honing process, Micromatic offers a complete line of equipment for processing all types and sizes of cylindrical and flat surfaces.

If your problem is production, precision, or costs let our organization of experienced engineers help you.



Write for issue of CROSS HATCH describing MICROHONING MACHINES

MICRO MATIC
TRADE MARK

MICROHONING MACHINES

MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

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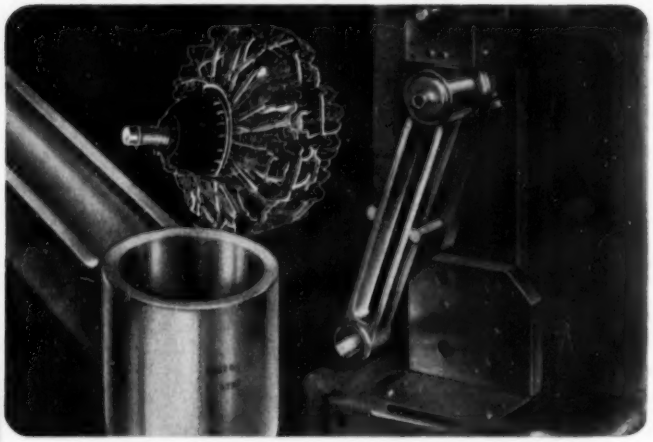
Leading Aircraft Engine Manufacturer
Saves 527 Hours Per Month
on a Single Marking Operation

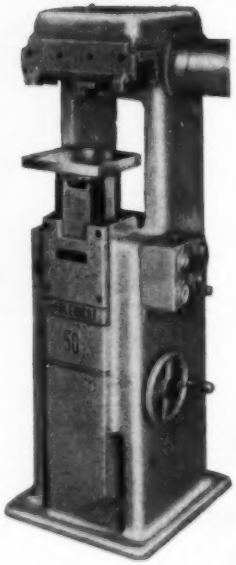


WITH THE

ROLL-O-MARK

all-pneumatic Model 50P1 illustrated here tooled for marking aircraft engine linkrods

The ROLL-O-MARK is the leader in the medium priced general purpose marking machine field. It utilizes the original NOBLEWEST *roll-marking* process which permanently rolls in inscription markings that last as long as the product itself. For the linkrod application illustrated above, tolerances on depth of mark were .0005 to .0015 —material tested 36 to 40 Rockwell "C". The ROLL-O-MARK is ideal for trade marking, part or patent numbering, codifying and serial numbering and will mark flat or round surfaces. For information on how Modern Marking Methods can cut costs in your plant, write The Noble & Westbrook Mfg. Co., 17 Westbrook St., East Hartford 8, Conn.



A MARK IS ONLY AS GOOD AS THE DIE THAT MADE IT. *Noblewest marking dies for use in NOBLEWEST marking machines are made to exacting standards that result in clearer impressions and longer life. We also make the necessary die holders and work-holding fixtures.*

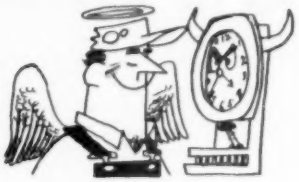
MARK IT BEST WITH NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

of authoritative information pertaining to airframe assembly costing?

V J Shroad, Jr
Philadelphia

We are sorry we cannot offer any suggestions in this matter. Do any of our readers know of a publication that would help Mr Shroad?—Ed.



O Tempora, O Mores

I read, with a great deal of interest, "Goodbye Time Clocks" on the Talking Shop page (*AM*—April 28 '52 p159).

My, oh my, what confidence! Do I, by any chance, see feathers sprouting on the shoulders of employees, that some firms have developed such a change in attitude toward their workers?

I am particularly interested in knowing what led to this drastic change in labor policy. Will this act as an incentive to other bold strokes? Will industry follow the example of the merchants and pay its men in advance? How far can business be conducted by putting human beings on their honor? Do I see a company cafeteria in the future where the employee keeps track of his meal and pays for it as he goes out? Will he feel so grateful that he will include a tip in his bill?

Of a certainty, this would be a lovely place to live in if we could depend upon man to be absolutely honest, but I am afraid something drastic will have to be done to change the ethics of a great many people. I am perfectly in accord with the claim that bread cast upon the waters will draw considerable fish, but don't forget the wise ones that got away—suspicious of a free lunch. It has been years since I associated with men in industry and, to be truthful, I am greatly surprised that such confidence, as displayed by the Parker Pen Co, should be placed in the workers. Is the millenium at hand?

Am I getting old and cantankerous, or is it that I went to San Diego yesterday and saw our boys lose their ball game in an eleven inning stretch?

Better insure your profits, Mr. Bigshot, by sticking to the time clocks. Start getting too magnanimous and

This Tiny Tap Tells a Big Turning Story

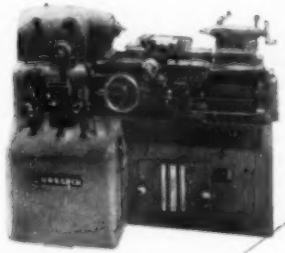
This tiny part portrays better than words the extreme accuracy you can expect from a Monarch 10" Model EE Precision Toolmaker's Lathe. The operation detailed below was actually performed on a standard lathe which is employed primarily to turn a variety of parts for small, precision, automatic tapping and drilling machines for the user's own manufacturing operations. These master taps which he chases occasionally are needed to make a master die. This, in turn, is used to produce working taps in quantity. End use is tapping a hole in the end of surgical needles to permit holding of the suture.

How surgeons thread the needles, we'll never know. We do know that in all probability you'll never have to work as fine as 200 threads per inch. But accuracy like this can be just as important to you, regardless. With the Monarch 10" Model EE, as a look at the listed features will at once reveal, you get a machine unequaled for precision, speed and sensitivity. Like most of the Monarch line of lathes, it can be furnished with "Air-Gage Tracer" controls . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Surgical needle master tap—overall length, ¾"—diameter, .0218"—threads per inch, 200—thread accuracy, held within .0001 over the entire threaded length of ⅝".

MONARCH 10" MODEL EE FEATURES

- All electric drive direct to spindle through multiple "V" belts. No gears in headstock.
- A true high speed lathe for small work. Available with speed range up to 40 to 4000 R.P.M.
- Totally enclosed, automatically lubricated end gearing and gear box.
- Flame hardened and ground ways for both carriage and tailstock. Bed all in one piece—no inserts.
- American standard Camlock spindle nose—for quick, rigid and accurate chuck and fixture mounting.
- Easy, fatigue-free operation. Base design permits operator to work close comfortably. He gets production—not backaches.
- Over 6000 10" Model EE machines in use.
- The only small lathe available with anti-friction bearing taper attachment.
- For thread chasing up to 100% faster, has exclusive combination of electric lead-screw reverse and variable reverse speed control.



Monarch

TURNING MACHINES

ACCURACY • ECONOMY • LONG LIFE

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

Gentlemen:
Please send me without obligation your complete illustrated Booklet 9302, covering the 10" Model EE Monarch Sensitive Precision Toolmaker's Lathe.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

taps won't break...

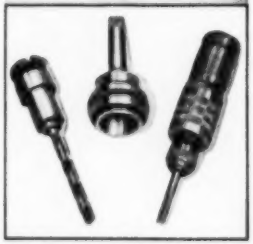
...Wickman Combination Tapping Attachment

- Applies Safe Torques ALWAYS
- Saves Taps, Labor, Materials

Here's an effective remedy for tapping headaches—a positive, safe tapping attachment with an entirely new clutch principle. This tapper guarantees your taps against breakage because it replaces coiled springs with a resilient material 100 times more effective than steel.

The Wickman Combination Tapper safeguards taps even in blind hole tapping; high resiliency of the pressure unit permits the clutch to slip the instant the tap strikes bottom or a hard spot. And, it's simple, too! Definite torque settings for given taps and tap sizes, without regard to materials being tapped, can be changed instantly without tools.

Wickman Tappers can be used on all reversible machines for horizontal or vertical tapping, blind or through holes. Three sizes are available: T-1, ½"-1¾" USS; T-2, ⅜"-1¼" USS; T-3, ¼"-½" USF.



NOW—IMPROVED DESIGN GIVES NEW VERSATILITY, FASTER CHANGE-OVER

New features on improved model include a new detachable tapper shank holder with quick change lock for tapper or drill adapter. Change-over from tapping to drilling, counterboring, reaming etc. is made in a few seconds. No tools necessary. Send for free bulletin for full details.

THE Wickman MANUFACTURING CO.

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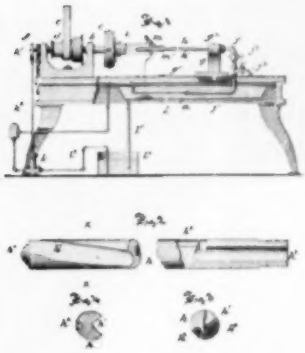
you're going to lose your shorts, and it won't be the fault of college co-eds either.

John Homewood
Ontario, Calif.



Gun Drilling

I have noted with interest your articles on gun drilling (*AM*—July 23 '51 p132; Feb 18 '52, p144; May 26 '52 p109); and would like to draw your attention to the fact that there is nothing particularly new about it.

As I explained in an article some time ago (*AM*—Feb 18 '43 p91) the fundamental principle of the single-groove, deep-hole drill and the method of drilling deep holes, as used today, were invented and patented in 1887 by John W Heyer, at one time in charge of the Gage Dep't of the Pratt & Whitney Co. The original patent drawing shows the oil channel through the drill tip and shank, the steps at the drill point for breaking up the chips, and the helical chip groove. The drilling machine has all the elements necessary for continuous deep-hole drilling, including power feed to the drill carriage, oil pump and tank, and a chip pan. The oil pump was driven by an eccentric on the spindle.

What I stated in my original article is equally true today, namely, that only when a gun drill is sharp will it drill a smooth, straight hole without runout. Once it has become dull, the phenomenon of the drill tending to follow the centerline of a revolving workpiece has been lost, and the drill starts to wander. Precision, machine sharpening is essential; free-hand sharpening by the drilling machine operator is an invitation to failure.

Frank O Hoagland
Master Mechanic
Pratt & Whitney
Div Niles-Bement-Pond
W Hartford, Conn

Into your hands — fast. Prompt delivery of the twist drills you need is one of your Union Distributor's many helpful services.

FROM GIANTS TO MIDGETS, from 3.5" diameter down to .0035", Union twist drills cut fast, cool and free, with minimum breakage and more work between resharpenings. See your Union Distributor for the types and sizes that will help boost production and cut costs on every drilling job you do — on any material, with any type of drilling equipment.

FIRST TEAM IN CUTTING TOOLS . . .

UNION and your LOCAL DISTRIBUTOR

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS • Milling Cutters • Gear Cutters • Twist Drills • Hobs • Reamers • Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass., Taps, Dies, Screw Plates. .

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BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates

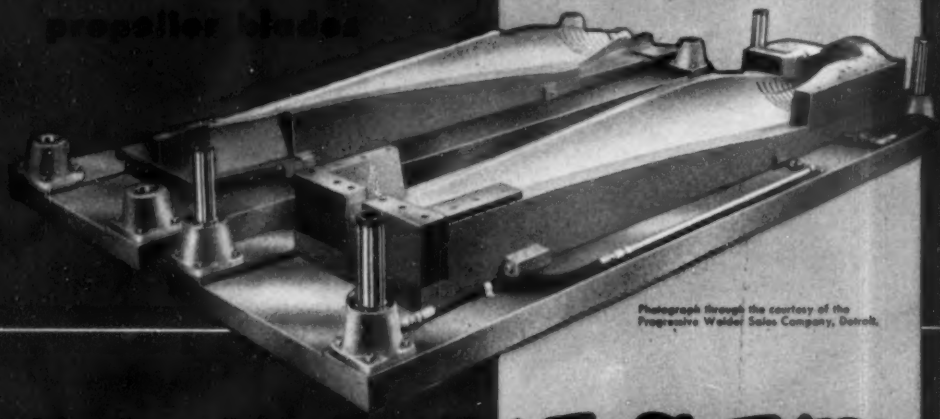
HOT FORMING

aircraft propeller blades

This unique new process takes a previously hot-worked billet and hot forms it into a one-piece hollow steel aircraft propeller. Now, in three steps requiring only a few minutes, a superior propeller is produced that formerly required hours of work.

The development gave rise to the problem of building a special 15 ton die that would provide a quenching action from 1450 degrees in a five minute press cycle.

For a die like this, the diemakers called for . . .



Photograph through the courtesy of the Progressive Welder Sales Company, Detroit.

DANLY DIE SETS

Reliable Danly precision plus unmatched facilities for the production of standard or special die sets like the one shown here make Danly Die Sets the first choice of diemakers everywhere. A nation-wide system of branch assembly plants* assures prompt, time saving service.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

CALL ON YOUR
NEAREST DANLY BRANCH
for fast, local delivery!

DANLY

PRECISION DIE SETS • STANDARD AND SPECIAL

SERVICE TO THE STAMPING INDUSTRY

SPOT NEWS of Metalworking

- **Large castings for M-48 Patton tank will be produced at former Columbia Steel foundry** at Pittsburgh, Calif., which is being taken over by Army Ordnance Corps as an arsenal. Conversion won't be completed before next spring, when about 1000 persons will be employed. Columbia-Geneva Steel Division of U.S. Steel will operate the arsenal, which was built in World War II.

- **Land-based version of Navy's A3D attack bomber will be turned out for Air Force** by Douglas Aircraft at Long Beach, Calif. It's a twin-engine jet, with crew of three, capable of speeds up to 700 mph. Air Force is calling it the RB-66, reconnaissance bomber.

- **All Navy bureaus have been instructed to comb their specification lists for steel** and apply commercial "specs" wherever possible. Program will not affect special steels used only for the military services.

- **Plan for Nato countries to have 50 army divisions by end of this year** and 50 more by 1954 is to be junked because of British and French financial troubles. French are using stringent financial conditions to press for more off-shore procurement contracts from Washington, but Pentagon insists that such awards will be made strictly on basis of ability to perform.

German-speaking employee of midwestern company, unpacking a foreign machine tool recently, reported excitedly that the markings indicated that it had come from Soviet-occupied Germany. Even more intriguing was presence of an 8-mm bullet between outer and inner crates of the machine, and a small hole in outer crate made by the bullet.

- **Navy is opposing Washington's action in diverting defense orders** to so-called distress areas. It claims too much shipbuilding is concentrated in New York district for national safety purposes and will resist further efforts to expand operations there.

- **If John L. Lewis' demands are exorbitant,** independent coal operators will bring terrific pressure on steel makers to resist them. Reason: Coal industry is in difficult economic position as result of shrinking markets and over-production. Steel companies are reported to have ample coal stocks for 70-days' operations, but distribution is uneven.

- **Steel strike set back Bethlehem Pacific's $47 million merchant marine shipbuilding program** four months. Keel of first of five ships was to have been laid Sept 1, but date now is put at year-end. Steel pipelines to east are said to be completely empty.

- **One of big new aircraft carriers may be powered by nuclear engine.** Navy's contract with Westinghouse calls for installation of its nuclear engine, upon completion, in a large ship. Only ships under construction which could use such an engine are super-carriers.

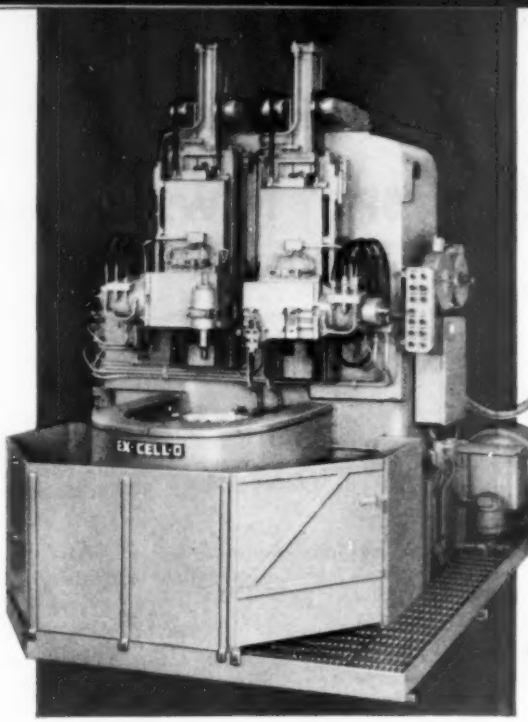
- **While Air Force has pushed up production schedules for J-71 and J-73 jet engines** as recommended by DPA, neither it nor the Navy shows signs of making sweeping changes in over-all production programs as urged by DPA. Trump card held by DPA is its well-documented report on military's weaknesses—red tape, archaic buying and testing methods.

New!

VERTICAL PRECISION BORING MACHINE

BY

EX-CELL-O



The new Ex-Cell-O Style 425 Vertical Precision Boring Machine.

XLO

A Flexible, Automatic Machine for Precision Boring, Turning, Facing

Developed by Ex-Cell-O, this standard Style 425 Vertical Precision Boring Machine is massive and versatile. It has a heavy-duty, high-speed work spindle and rigid tool slides for close-tolerance work with a fine surface finish. It's designed for accurate production work on large parts.

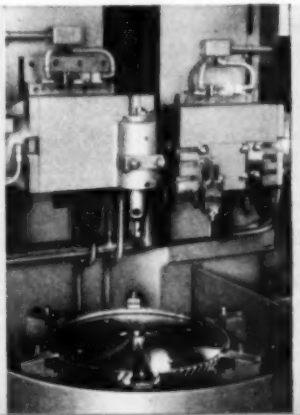
The heavy cast base supports a column on which two vertical slides are mounted, each carrying a cross slide. Slides are operated by large hydraulic cylinders and move on hardened and ground steel ways. Vertical slides are fully counterweighted. All these features mean smoother operation.

The large work spindle supports a 36-inch diameter table having T-slots for mounting fixtures. The table is driven through a precision worm at variable speeds up to 500 rpm.

The machining cycle is completely automatic, including movements of vertical and cross slides, changes in work speeds, flow of coolant, and lubrication.

For more information and complete specifications on this new machine call in your Ex-Cell-O representative or contact Ex-Cell-O in Detroit today.

Close-up view of the Style 425 equipped for operations on an aluminum jet compressor wheel. Tools in the left slide precision bore, counterbore and chamfer the central hole, then feed-face the small hub. The right slide finishes a rabbet in the large outer rim.



12 Features OF EX-CELL-O'S NEW MACHINE:

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- Counterweighted Slides
- Large Hydraulic Cylinders
- Hardened and Ground Ways
- Flexible Automatic Cycles
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52-23

Washington

All-out military production—or something close to it—in the last five months of 1952—that's the aim of mobilization officials.

• • •

Key defense production gets priority on steel—nobody else. Arms and military equipment get double their pre-strike steel in the fourth quarter. Atomic-energy projects, machine tools and their components also get all they claim they will need in the quarter.

Idea is to get arms back on schedule, to the prestrike levels of deliveries. Only a few lines can make up some of the losses stemming from the strike. Ammunition is one. But most deliveries will stay two or three months behind.

• • •

The mobilizers are gambling in putting defense first, cutting allotments for all other steel users. First, they may not be able to stick to their guns in this election year. A sure bet is that there will be heavy pressure for more steel for non-defense users, and the controllers may have to yield.

And the gamble may not pay off. Arms makers never have used up all the metal the military have claimed for them. They probably won't be able to double their steel use now, and if they put it in inventory while other users are hurting for steel, there'll be howls.

• • •

But no one will be hurt badly for lack of steel, the controllers think. There'll be some for autos, appliances, and other consumer goods—enough to meet anticipated buyer needs.

Real pinch will be on industrial equipment—other than tools—for new aluminum, chemical, electric power plants, oil pipelines, and refineries. But any slowdown, the controllers believe, will be brief, and there'll be plenty of steel for everyone next year.

• • •

That's one reason why self-authorization limits are being raised for the first quarter. You'll be able to write your own allotment for a maximum of 500 tons of carbon steel, instead of the present 60 tons, for delivery after January 1. Other increases: 90 tons, instead of 16, of alloy steel; 10,000 lb. of nickel-stainless, instead of 500; 40,000 lb. of copper, instead of 20,000; 60,000 lb of aluminum, present 40,000-lb limit.

• • •

Cut in NPA field staffs—they're virtually being eliminated—is another reason for boost in self-authorization ceilings. NPA no longer will be able to process allotment requests from small or medium-size metal users. It's good news for thousands, particularly small machine-shop operators, who can forget about first-quarter-allotment applications, soon due at NPA. But they'll have to keep records of their metals use.

• • •

Note change in air power. B-36 superbomber was shelved by Air Force. Those under contract will be completed, but no more will be built.

It's a switch from Maginot-line concept of reliance almost solely on big bombers to a three-dimensional air force—strategic air, tactical air support, and air defense. New strategic air arm will consist of fast, but smaller, jet bombers in the medium class. Tactical air support for ground operations will get an equal share along with air defense. The Strategic Air Command will no longer be the elite corps of the military.

• • •

It took a command change to do it. With air chief Vandenberg now ailing and planning retirement, Air Force is under Gens. Twining and Kuter. They ordered a new split-up in spending Air Force procurement funds. The switch from B-36s to smaller bombers will mean more planes—and sooner—for the same money.

The shift forestalled an inter-service row. Navy and Army brass were set for a showdown on air power. The Navy wanted a bigger role in air operations—both strategic and tactical. And the Army demanded a bigger role in air-transportation of its supplies and troops. That's why Army switched its aviation from Signal Corps to the Transportation Corps.

Chances are now that the Army will get cargo planes for its own use and will set up a new Army non-combat air arm. Thus far, Army aviation has been confined to light planes for communication and observation.

• • •

Repeal of Taft-Hartley is not in sight next year, whether Eisenhower or Stevenson wins. Both believe in the two-sided principles in the labor law, admitting room for improvements.

Much will depend, of course, on what kind of a Congress is elected. But the most that organized labor can hope for is the elimination of some undesirable features—conceded by Taft himself—and possibly a new name for the law.

One possibility is that union leaders won't be asked to sign non-communist affidavits anymore. Instead, unions would be asked to bar communists and their sympathizers from holding office. This is recommended in a Senate labor-subcommittee staff report.

• • •

The small-business exemption from wage and salary controls does not apply to shops employing tool, die, or pattern makers, nor to automotive repair shops and certain other special groups.

Lowest Cost Way TO DE-BURIZE up to 300 Gear Teeth per minute

MODEL NO. 380-A

Cut finished gear costs and raise output at the same time—with Sheffield #380 Series Gear Deburizers which offer the following advantages.

★ Burr or chamfer spur, helical, hypoid, bevel and herringbone gears, also, multiple start worms, up to 7" O.D. (Model #381 will handle gears from 6" to 12" O.D.)

★ Operate on automatic or continuous cycle generally without clamping the work gear.

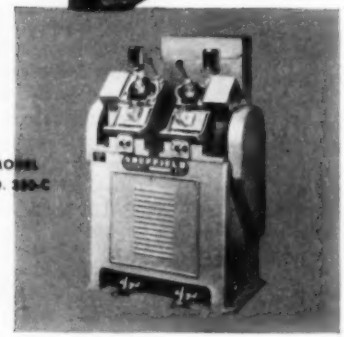
★ Use simple, low cost standard tool bits which are easily sharpened on the face angle only.

★ Interchangeability of tooling with minimum down time.

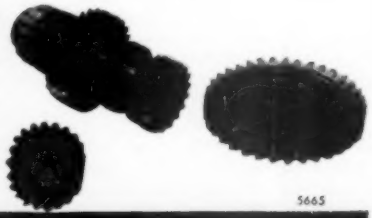
★ Small, compact, low cost machine requires minimum of setup and changeover time—and practically no maintenance.

★ Direct drive assures positive indexing.

Write for specifications #B-380-50 —or call your Sheffield Representative.



MODEL NO. 380-C



5665

the Sheffield

Detroit

Automobile production hit the lowest level in about six years during the week ended August 2. Volume was driven down by lack of strike-bound steel to 22,615 cars and trucks, U. S. and Canadian plants included. That reduced July's total to somewhere around 215,000 units, a low for any month since March 1945.

August production was to hit an increasing curve. Some companies had high hopes of getting back just about to normal by the end of the month. Others, though, foresaw irregular schedules into September. One thing was sure: All pressure was being directed toward getting inflows of steel and steel components immediately, if not sooner. One important means: Big quantities of conversion steel.

• • •

The automotive community was wondering, meanwhile, what the mid-August meeting of NPA would bring forth. Substantial military bites into steel may develop. That could mean cutbacks in fourth-quarter plans. Even if allocations on a per-vehicle basis are good, there are fears whether enough bookings can be made at steel mills to reach all allowable quotas.

One steel company said, "We've enough on our books right now to overfill our capacity till after the end of the year. We want no more orders, but we'll get 'em."

Most companies are continuing the plans indicated earlier—to make nearly all, if not all, of their originally contemplated 1952-model runs. Some few have cut off portions of the projected schedules, but not many. Practically all, though, expect to be able to catch up on the lost assemblies to the extent that changeovers will be delayed very little, if at all.

• • •

Tool shops attest to this 1953 planning. All in the Detroit area have been heavily booked for some time now. Their prime preoccupation is manpower. Although employment is 1000 (or about 10%) below wartime peaks in this area, good craftsmen—or any—are practically impossible to find. Why the scarcity, with employment still 10% below peak? One tool-shop operator snorted a quick answer: "Those weren't tool and die workers back in those days. They were upgraders."

Sales, meanwhile, are strong. Used-car prices have been definitely firm, reportedly because some of the lots have been stocking vehicles in anticipation of future shortages.

• • •

Newest reshuffle in defense planning involves Chrysler and its huge jet-engine plant for the Navy in Detroit's northeast section. The J-48-engine contract has been cancelled; it will be replaced by something as yet undecided. The big plant will be completed for the new project.

• • •

General Motors requires very little tooling for the air-conditioning unit to appear on its 1953 Cadillacs and Oldsmobiles. The air conditioner, to be stored on a shelf in the rear of the trunk compartment, is similar to that in room conditioners. It reduces summer heat to comfortable levels inside a car within six blocks, permits the car to be driven under dusty conditions with the windows closed.

General Motors, incidentally, has combined its engineering staff, automotive ordnance, and car-development groups.

• • •

Ford Division, too, has realigned. Its manufacturing operations now split into two major areas: (1) Assembly plants, production control, traffic, plant engineering, and manufacturing engineering; (2) quality control, technical services, process analysis, manufacturing standards, and manufacturing planning. Respective heads: W. D. Singleton and James O. Wright.

The hardtop coupe is rapidly moving toward the position expected for it when it was introduced a few years ago—a point where it will virtually obsolete conventional coupes. At Lincoln, for example, hardtops account for more than 50% of retail orders; and production schedules on the hardtops have been increased twice already this year.

Timken-Detroit Axle Company has made one of the longest guarantees yet. Any truck owner with a Timken-Detroit Axle can get a new shaft free if the original shaft fails within 100,000 miles or three years. The company's reason for confidence: It says its torsion-flow forging process makes the grain structure of the steel conform to the flange profile, so twisting stresses are against the grain flow. In addition, high surface hardness is supplied by special heat-treating, graduated to a softer center core; shot-peening is used for additional skin hardness.

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Levers to engage Feed & Quick Return Spindle
Direct Reading Plate for Spindle Feed
Selector Switch for Dual Control of Head and Column Clamps
Switch for Built-in Spindle Light
Feed Change Lever
Push Button Controls raise, lower, stop, clamp & unclamp Arm
Direct Reading Plate for Spindle Speeds
Push Button Controls clamp & unclamp Column
Speed Change Levers
Power or Hand Feed Selector
Counter Balance Spindle Adjustment
Depth Dial Lock Lever
Graduated Depth Dial
Hand Traverse
Push Button Controls for Main Drive Motor
Push Button Controls to Traverse Head
Push Button Controls clamp & unclamp Head
Hand Feed
Tapping Interlock
Start-Stop Reverse Lever
CARLTON

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MECHANICAL ADVANTAGES

Ground teeth, hardened gears with wide faces.

Hardened spindle.

Ball and roller bearings.

Column clamp mounted in Arm.

All parts, wherever possible, are machined from drop and hammered forgings.

MAINTENANCE ADVANTAGES

Every part is jig machined to guarantee absolute interchangeability of parts.

Entire machine is assembled on the unit principle.

Only one friction clutch unit to adjust.

Simple electric circuits to all motors.

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OPERATION ADVANTAGES

Dual clamping to Head and Column. Automatic clamping for Arm to Column.

Pushbutton operated Arm elevating control.

Automatic lubrication to column with column cleaned by wipers from top to bottom.

2 levers control 36 spindle speeds from Head.

Direct reading and indicating speed and feed chart.

Electric light built in Head near spindle.

Adjustable counterbalancing spring operating with standard geared-to-spindle counterweight.

Positive feed clutch with serrated teeth.

THE CARLTON MACHINE TOOL CO.

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO, U. S. A.

Machine Tools

The sudden upturn in machine tool orders in June was not just a flash. Though no official figures are available, builders say that July bookings compared favorably with those the previous month.

What's more, there is reason for believing that the volume of orders is likely to stay up the next few months.

Air Force, bad actor in forcing cancellations, is mainly responsible for the upswing. The wave of cancellations, incidentally, has about spent itself, fortunately for the industry.

• • •

Recent amendment to NPA's M-41 will help a large segment of the machine tool industry. While it is true that all unrated orders are subject to being sidetracked at the last minute, chances are that most orders will be delivered as specified to non-defense customers.

It now appears that machine tool shipments this year are likely to be in excess of $1 billion. June production was about $99.5 million (not counting the press people).

July shipments are believed to have topped the $100-million mark.

• • •

Production is not likely to go much higher, however. There is no reason, on the other hand, for it to go lower for many months.

Some builders are faced by the problem of whether to expand further or to let attractive orders be taken by competitors on a delivery basis. In this dilemma they are very reluctant to try to push operations beyond the current level.

• • •

A team of officers from the armed services, with Payson Blanchard, NPA special consultant, acting as the leader, has just concluded a two-weeks' swing through New England, visiting machine tool builders.

The group is visiting companies making so-called critical tools for the defense program. It is studying problems of the machine tool industry and effects that government orders and regulations have had on machine tool production.

In each case, members of the group make a tour of the plant.

The results of these visits, it is hoped, will help in implementing "machine tool orders with particular emphasis on the setting up of order boards and schedules."

• • •

It is understood that the initial report by the team will be the basis for part of the discussion at the next meeting of NPA's Machine Tool Industry Advisory Committee on August 21.

After a week's respite, the team resumed its travels starting at Elmira, N.Y., and working west. It probably will be out until the end of September, going as far as the Chicago-Milwaukee-Rockford area.

Members of the team representing the services are: Capt. John F. Gallaher and Lt. Com. William F. Zweig of the Navy; Col. John M. Wallace and Maj. Jack A. Fisher of the Air Force; and Col. R. R. Wentz of Army Ordnance.

• • •

Two major machine tool shows will be held abroad soon. The Second European Machine Tool Exhibition is scheduled for Hanover, Germany, Sept. 14-23.

Some 800 exhibitors will display their machines. Continental countries will predominate. Herr Hermann Heller of Germany is president of the international committee staging this show.

• • •

The British will put on the International Machine Tool Exhibition at Olympia, London, Sept. 14 to Oct. 4.

It is the first London show in four years and will have on display some 2000 machine tools. About half of them will be British and the remainder mostly from the Continent. For details of new developments to be unveiled at Olympia, turn to story on p 150.

Just why are some foreign machine-tool orders given ratings and others are not? MSA would like to know. Example: Recent orders for Opel Works in Germany were mostly rated. But a few machines, just as urgently needed as the rest, were rejected for ratings.

Result is that NPA and MSA are trying to work out uniform standards for the granting of priorities for non-defense orders for export.

• • •

Certain observers are taking a dim view of the so-called Vance Committee (Advisory Committee on Production Equipment) and what it will do to be of help in stabilizing the machine-tool industry.

The problem of legislation authorizing quicker depreciation of new machine tools is understood to have been discussed. Some committee members are said to be lukewarm about benefits to be derived from such legislation.

• • •

The machine-tool industry is planning on a show in September, 1955, at the International Amphitheater in Chicago, according to latest reports.

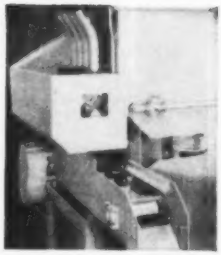
It will be the first show to be staged by the industry since 1947, when the former Dodge-Chicago plant was the scene of the biggest display of machine tools in history.

No space comparable in size is now available. But Chicago is preferred because of ample hotel accommodations.

13,600 Splines/hour on one machine

The part: Steel forgings in which 17 internal splines of 1½" O.D. are to be broached.

The machine: A Colonial 20-ton 48" stroke Pull-up with multiple loading chutes, positioning shuttle and automatic ejector conveyor.

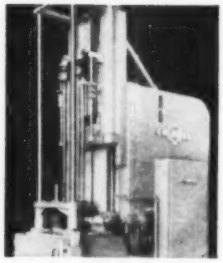


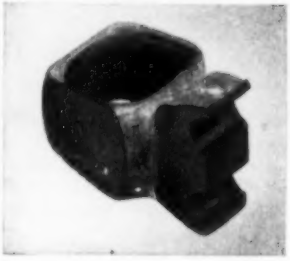
Colonials help you do MORE JOBS on FEWER MACHINES

12 Surfaces, 8 Bores on two machines

The part: Tank track forging requiring finishing of 6 flat surfaces and 4 bores in thin webs, broached two at a time.

The machines: Colonial 25-ton Dual Ram for flat surfaces, Colonial Pull-down with automatic spreaders to support the part while broaching bores.

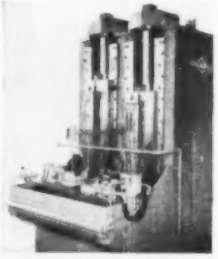


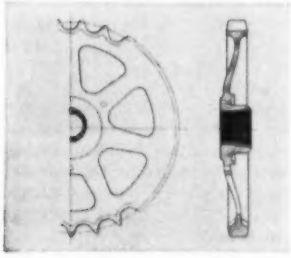


7 Surfaces, 4 Operations on two machines

The part: Tank track center guide to be completely machined as shown.

The machines: Two 25-ton Dual Ram machines perform all operations, produce one guide for each machine cycle.

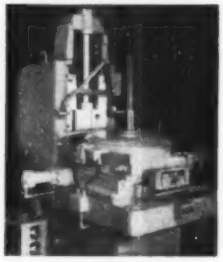




Large Tapered Splines Broached in One Setup

The parts: Tractor wheel hubs, (several sizes).

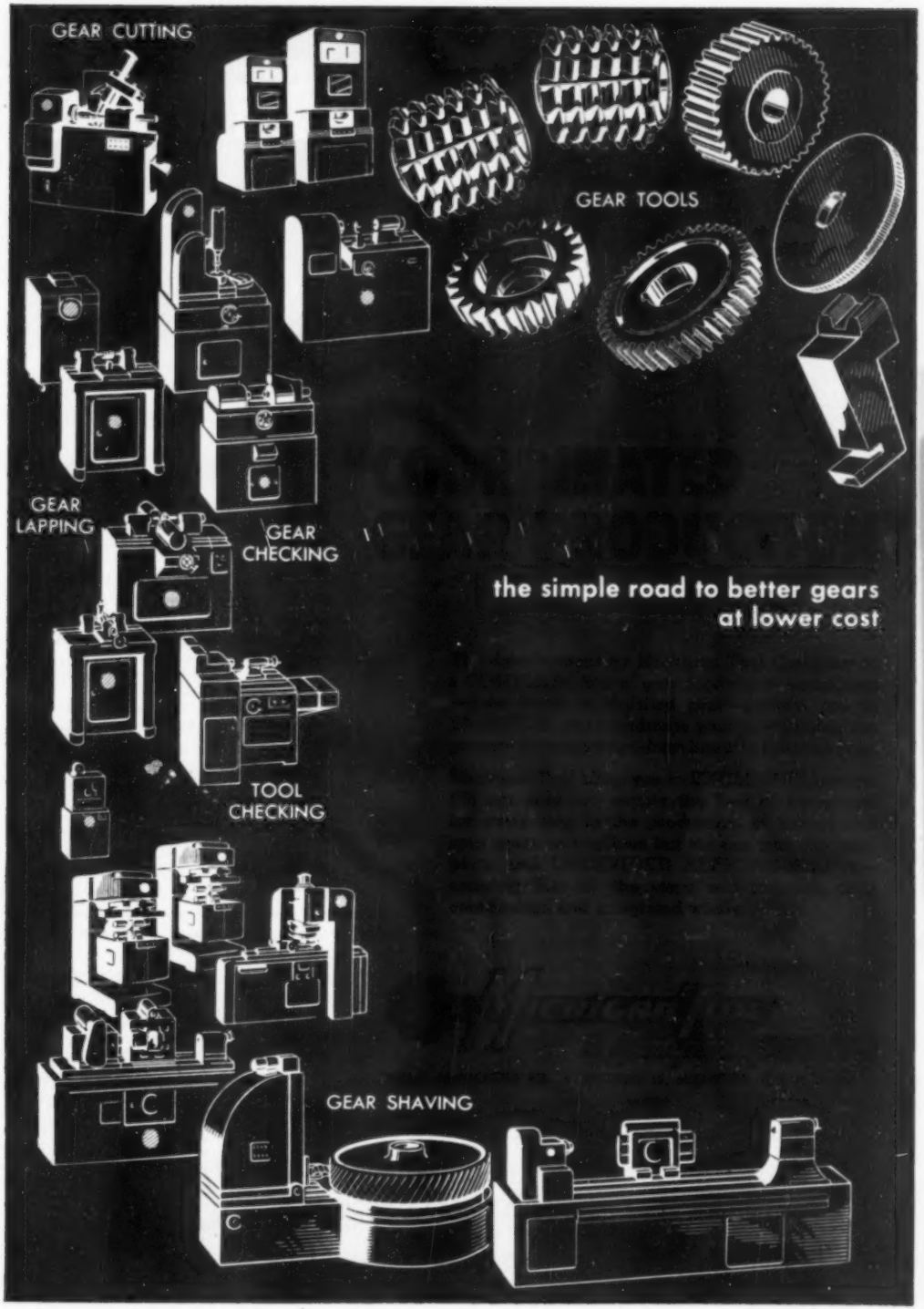
The machine: Colonial 15-ton Pull-down equipped with special angular short-shuttle table, and automatic index.



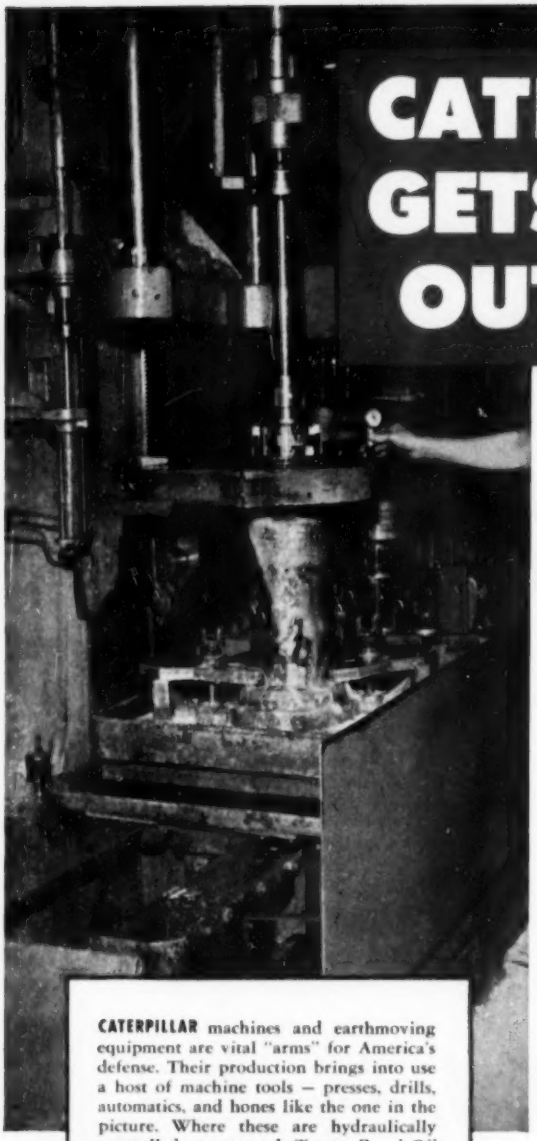
PIONEERS OF HSS BROACHING

BROACH CO. DETROIT 13

For further information on the examples shown here, ask for Broaching News, Volume XIV, No. 3


GEAR CUTTING
GEAR TOOLS
GEAR LAPPING
GEAR CHECKING
TOOL CHECKING
GEAR SHAVING
the simple road to better gears at lower cost

CATERPILLAR GETS ORDERS OUT FASTER



CATERPILLAR machines and earthmoving equipment are vital "arms" for America's defense. Their production brings into use a host of machine tools — presses, drills, automatics, and hones like the one in the picture. Where these are hydraulically controlled or operated, *Texaco Regal Oil (R&O)* as the hydraulic medium assures clean, trouble-free operation.

...with the help of TEXACO REGAL OIL (R&O) in hydraulic mechanisms

To maintain production and meet delivery dates, machines at Caterpillar Tractor Co.'s plants *must keep working*. Unscheduled stoppages of hydraulic mechanisms, for example, simply cannot be tolerated. So quality comes first in choosing a hydraulic medium. *Texaco Regal Oil (R&O)* has proved ideal.

For Caterpillar, as for other quality-wise manufacturers, *Texaco Regal Oil (R&O)* assures: 1) clean hydraulic systems; 2) smooth, uninterrupted operation; 3) protection of internal parts against rust; 4) longer operating periods between drains and overhauls; and 5) lower maintenance costs.

Texaco Regal Oil (R&O) is specially refined from choice base stocks, then processed and fortified with special Texaco additives. *Texaco Regal Oil (R&O)* is thus *more than ten times more resistant to oxidation* than ordinary turbine-quality oils, gives far greater protection against rust and sludge, and will not foam.

There is a complete line of *Texaco Regal Oils (R&O)* approved by leading hydraulic manufacturers. A Texaco Lubrication Engineer will gladly show you how they can improve performance and reduce costs in your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

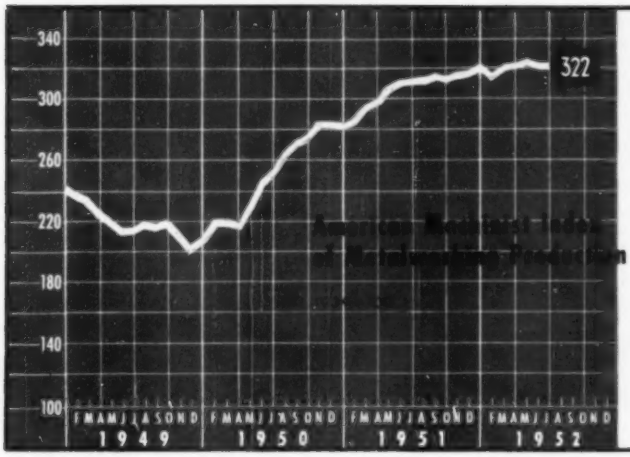
TEXACO Regal Oils (R&O)

FOR ALL HYDRAULIC UNITS

Faithfully yours 50 *for Fifty Years*

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

Gaging Metalworking



INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	JULY '52(*)	JUNE '52(p)	MAY '52(r)	JUNE '51
	322	322	321	310
Machinery	315	317	304	
Electrical Manufacturing	346	349	351	
Automobiles	233	230	235	
Transportation Equipment	542	526	389	
Other Metalworking	311	311	323	

(*)Estimated (p)preliminary (r)revised

Steel still is the key to metalworking operations the remainder of the year.

Many users are just now reopening their plants after shutdowns ranging from 3-5 weeks.

Others, who hoarded steel against a longer strike, have been back at work a week or longer.

• • •

The real impact on non-defense steel consumers is likely to be felt late this month and on into October. Users dependent upon warehouses look for relief next month, but expect to be in a tight spot until January.

Truth is that most metalworking manufacturers don't know where they stand.

Their production rates from here on will be determined by: (1) How long it takes steel mills to resume full schedules; (2) effect of Washington directives restricting non-defense steel uses; (3) ability of component parts suppliers to get rolling without serious deficiencies along assembly lines.

• • •

Many big consumers feel that production the rest of '52 and through the winter is likely to be less than it was before the steel strike.

Certain steel users are worried about inventory limitations imposed by Washington. They say they cannot hope to get production up to top levels with only 30-days' stocks on hand.

Auto parts makers with steel in their yards are being held back because customers have not yet lifted their "hold" orders for parts.

• • •

West Coast metalworking shops have been less hard hit than any other part of the country.

Defense contractors, in general, have not suffered seriously from the strike. Many, in fact, have not been affected at all.

• • •

Managements of consumer-goods makers in particular are fearful of the ill effects upon consumer buying if increased costs stemming from high steel prices are passed along to customers.

Forging industry estimates that the influence of the strike will hold until next March. Wire shortage, on other hand, may be over by November.

Gray iron and malleable foundries are reported to have enough business to keep running at a high rate all of this year, thanks to the steel strike.

• • •

Steel companies will make a desperate effort to bring down enough ore to tide them over the winter. But chances are that some blast furnaces may be down next March as the ore supply gives out.

New orders for special dies, jigs, fixtures, molds and gages and special machines have increased, National Tool & Die Manufacturers Association reports. Backlogs of contract tool and die shops continue to go up.

Shipments by these shops are one-fifth better than they were a year ago.

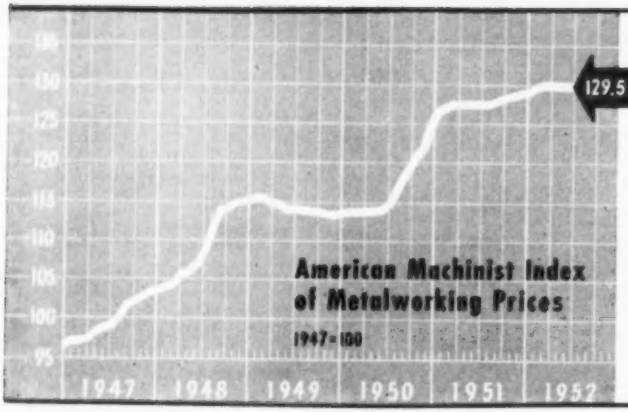
Vast majority of companies are running 50-60 hr a week. Outlook is favorable for continuation of current conditions.

• • •

There has been a turnaround in the sales of some consumer goods, including home appliances.

Heavy goods, sparked by the defense program, still are the bulwark of metalworking production. But incoming orders in many segments, including industrial machinery, are far below the level of 1951. Pile-up of orders is large enough, however, to insure continued high output.

Gaging Business



PRICE INDEX

	JULY(e) 1952	JUNE(p) 1952	MAY(r) 1952	JUNE 1951
	129.5	**129.5**	**129.7**	**127.8**
Metalworking Machinery	136.7	136.7	133.2	
Other Machinery exc. Electrical	132.5	132.5	132.1	
Electrical Machinery	125.1	125.8	126.8	
Fabricated Metal Products	127.7	127.9	124.8	

(e)Estimated (p)preliminary (r)revised

July industrial output is estimated at 192 (1935–1939 =100). It hasn't been that low since April, 1950. But now that steel mills are operating at or near capacity, there should be a considerable snapback in August; possibly all the way to 205.

• • •

Industry continued to produce in spite of a steel shutdown which lasted for eight weeks. This was not surprising, even though government spokesmen warned that one day's loss of steel would threaten national security.

Steel strike resulted in a loss of nearly 20 million tons of steel. Unemployment in steel and dependent industries reached 1.5 million. Loss in wages was close to $600 million. Some industrial plants were closed, so profits are lower.

• • •

Industrial expansion will be delayed. During first half of 1952, actual work put in place under the facilities-expansion program aided by rapid tax writeoffs ran about 10% behind schedule. In the third quarter, actual work put in place will fall behind by an even bigger percentage. Capital-goods-producers' allocations will be cut further so deliveries of electrical and general machinery for new plants will be held off several months.

• • •

Consumer goods will be pinched most of all. Steel for civilian uses for the balance of 1952 will probably run about 10% to 15% below current requirements. This will be the tightest steel situation since 1946.

Consumers don't think this is a good time to buy, according to a recent survey made by the Survey Research Center at Michigan University.

Living costs were the highest on record on June 15. BLS's consumer-price index climbed 0.3% above the May index. Reasons for increase: higher food prices and higher cost of miscellaneous items.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	222.5	218.0	232.8
Steel ingot operation (thousands of tons)	1,737	891	2,021
Electric power output (million kilowatt hours)	7,405	7,328	7,003
Production of automobiles and trucks	22,615	42,514	117,010
Engineering construction awards (*Engineering News-Record*, millions)	$ 253.1	$1,131.6	$ 216.9

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators, sales (thousands of units)	374	264	309
Vacuum cleaners sales (thousands of units)	207	217	195
Washers sales (thousands of units)	272	214	253
Household electric ranges sales (thousands of units)	88	69	108
Radio production (thousands of units)	874	748	1,120
Television production (thousands of units)	361	309	353
Gear sales index (1935-1939 = 100)	452.3	425.9	800.9
Foundry equipment new orders index (shipments 1937-1939 = 100)	353.8	225.2	393.2

* Seasonally adjusted.

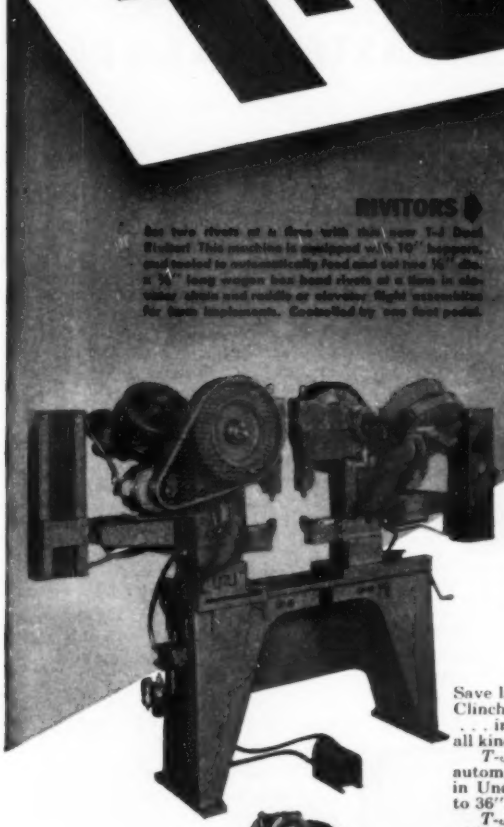
DOUBLE YOUR PRODUCTION WITH

T-J

DOUBLE RIVITORS AND CLINCHORS!

RIVITORS

Set two rivets at a time with this new T-J Dual Rivitor! This machine is equipped with 10" hoppers, and tooled to automatically feed and set two ½" dia. x ¾" long wagon box head rivets at a time in elevator cabin and saddle or elevator flight assemblies for farm implements. Controlled by two foot pedal.



CLINCHORS

Set two nuts at once with the new T-J Double Clinchor! This machine is tooled to feed and set ⅜" x ½" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors are tripped by the same foot-operated valve. Adaptable to a wide range of clinch nut setting problems.

Save labor . . . speed up production with T-J Rivitors and Clinchors adaptable to a wide range of assembly jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds.

T-J Clinchors set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J Rivitors automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets 1/8" to ¾" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅜" diam. and up to ¾" long. Throat depths 8" to 36".

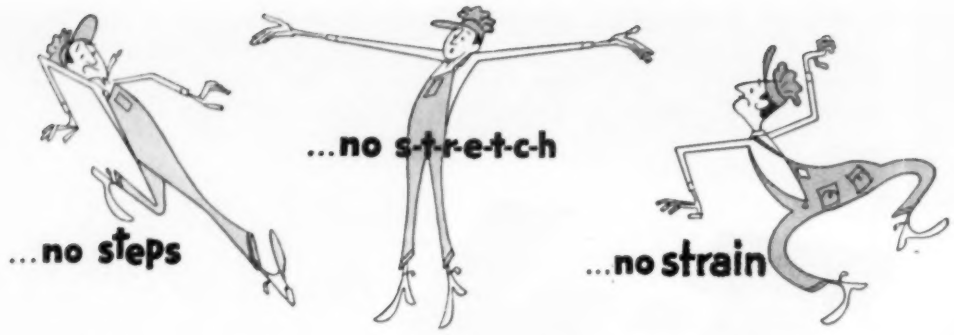
Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Company, Jackson, Mich.

T-J Rivitor used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.

36 YEARS EXPERIENCE T-J

TOMKINS-JOHNSON

RIVITORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS



drill....ream....tap....FASTER, EASIER!

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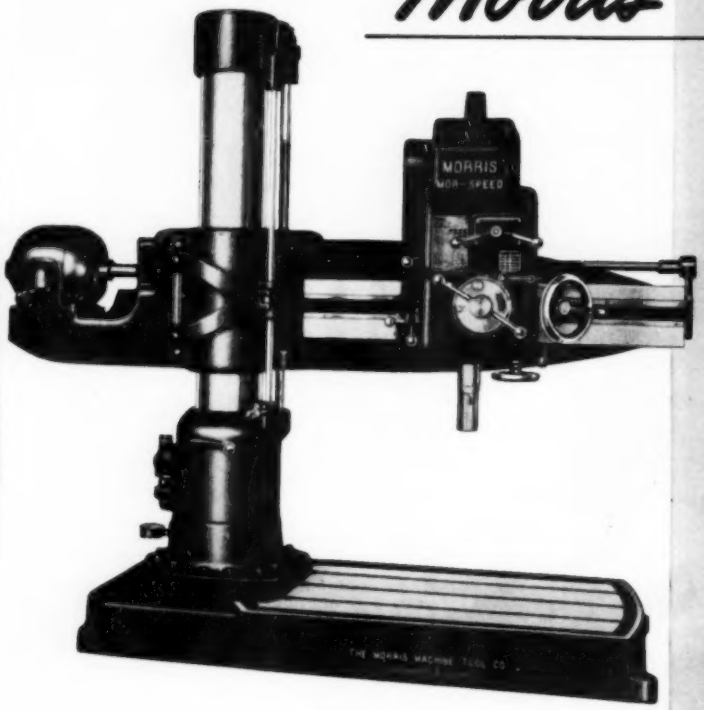
MOR-SPEED RADIAL DRILLS



Designed to set a cost-killing pace in the race for profitable production, MORRIS Mor-Speed RADIAL DRILLS offer a long list of outstanding features:

- ★ Centralized Controls—Reduce time between cuts.
- ★ Variety of Speeds and Feeds—Better selection of the right combination for every job.
- ★ Automatic Lubrication — Saves wear, insures accuracy.
- ★ Greater Strength, Rigidity and Balance — Provide greater machining precision.
- ★ More Automatic Stops—Save time and reduce manual control.

If you're interested in removing metal faster, write for your copy of the new MORRIS Mor-Speed RADIAL DRILL catalog.

a better product at less cost with precision PLUS production

Morris

THE MORRIS MACHINE TOOL COMPANY, 933 HARRIET ST., CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Eight Points for Politicos

Politics is everybody's business. As Republicans and Democrats prepare for the free-for-all campaign. We hope they will keep in mind these principles affecting our industrial economy:

1.. Pressure blocs are a growing menace. They represent the selfish interests of minority groups. Seldom do they serve the public good. They cannot be eliminated, but their influence can and should be minimized.

2.. Government controls are a necessary evil. They should be invoked only in serious emergencies and should be laid aside as soon as possible. That is especially true of control of materials and of prices.

3.. The Taft-Hartley Act is sound and should be retained. It restored to employers certain rights of which they had been deprived by the Wagner Act. No reasonable person will deny employees the right to organize. At the same time no reasonable person will deny employers the right to talk to their workers.

4.. Industry-wide bargaining is a menace to employers and to employees. It puts that industry's destiny into the hands of a few men or even one man (John L Lewis, for example). It is a denial of local self-government. It proceeds on the false premise that conditions are alike everywhere within one industry—in little companies as well as big ones, in the mountains of Vermont as well as in Detroit.

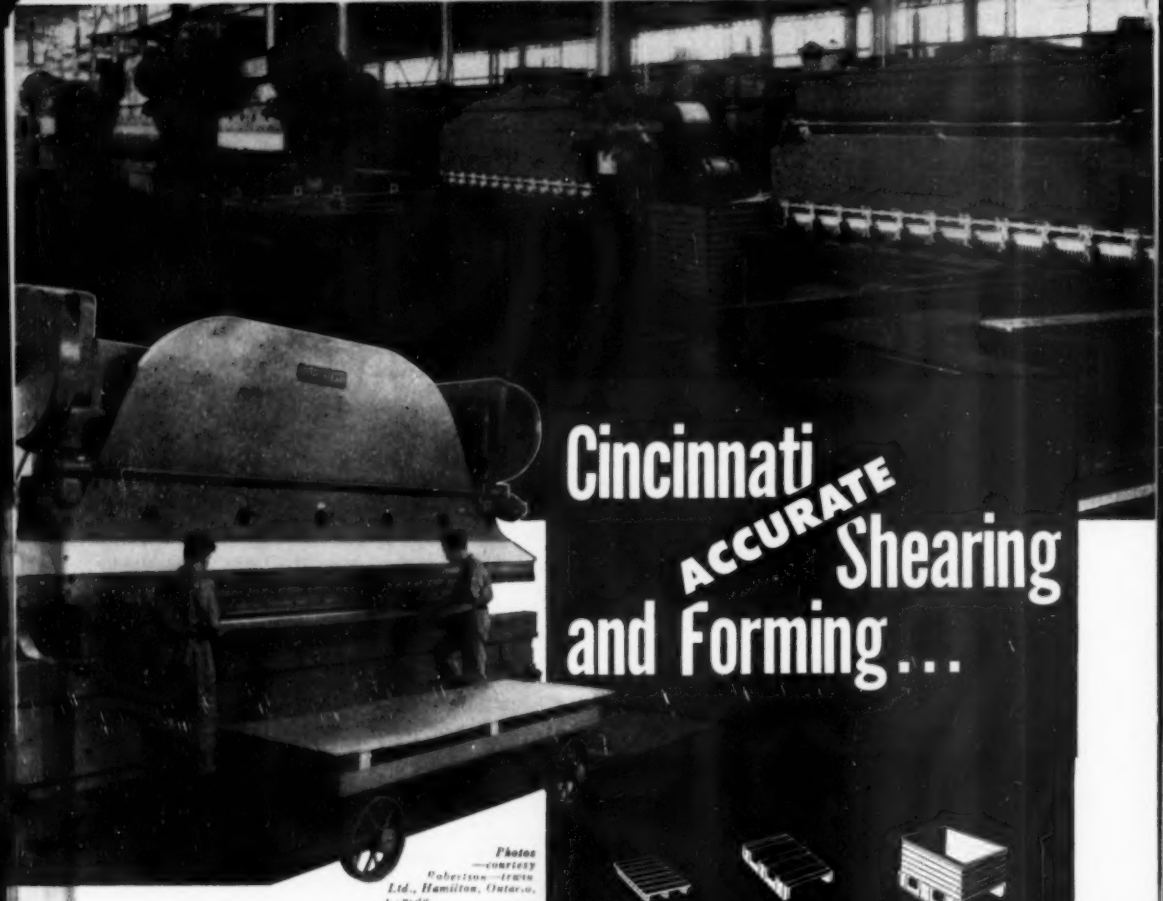
5.. Feather-bedding or its equivalent has no place in our economy. It is a leech on our industrial system. It directly fosters soldiering on the job, taking two men to do one man's work. It needlessly increases costs and promotes inefficiency. It is a symbol of a decadent society, not of a growing, vigorous one.

6.. Industry should be permitted to earn a fair and reasonable profit. It should not be taxed beyond the point at which incentives for the starting of new businesses and expansion of existing companies are removed. Most expenditures for new plant and equipment, an accurate barometer of industrial activity, come out of earnings which thus are ploughed back.

7.. We cannot be prosperous as a nation by clinging to a policy of one-way trading—exporting our goods and refusing to import goods from elsewhere. We must buy goods from other nations or give them the dollars with which to purchase goods from us. The latter policy is expensive for taxpayers and is wrong in principle.

8.. Our economic strength springs from over-increasing productivity. Industry cannot stand the burden of mounting wage rates and ever-growing fringe benefits for employees unless productivity per manhour keeps rising. That means constant mechanizing of manufacturing processes. It means replacement of old machines with new machines, which do the job better and faster at less cost per piece. It means adoption by government of wise tax policies which encourage such replacement by speedy write-offs of funds spent for new equipment.

Burnham Finney



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Photos —courtesy Robertson—Irwin Ltd., Hamilton, Ontario, Canada.

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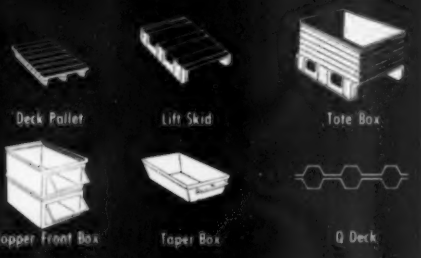
It is efficient production of quality products at lowest costs—from flat sheet to finished product controlled accuracy is the story.

Write for Shear Catalog S-6 and Brake Catalog B-3, or consult our Engineering Department.



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

AIR MAY SOLVE YOUR GAGING PROBLEM

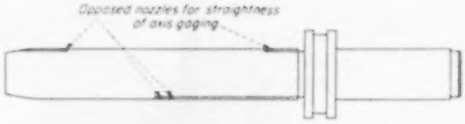
There's nothing complicated about an air gage; it's fast and easy to use, and requires no special training. Moreover, it is, comparatively, not subject to wear, nor can it damage the most delicate surface

By WM T NYSTROM, TAFT-PEIRCE MFG. CO.

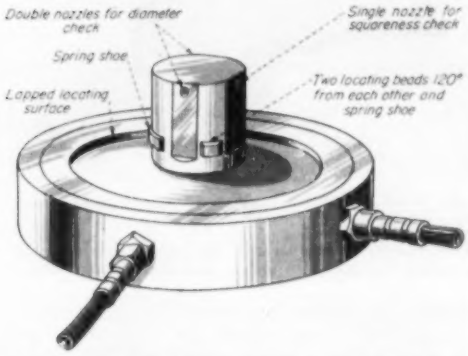
ONE of the great technological advances in recent decades has been the progressive application of air gaging in the production industries. In former times, measurements were accomplished by manually manipulated gages, with consequent inaccuracies caused by human variations in touch. Such measurements can now be achieved readily through air indicating gages, with the exact dimension indicated on the face of an easily read dial, and with wearing contact between gaging member and part unnecessary.

The impact of this advance has been felt particularly in the metalworking industries, where pneumatic measurement has assisted materially in making possible bona-fide interchangeable manufacture.

It was after World War II that air gaging experienced its greatest expansion. Going beyond the simple measuring of bore size, practical and straight forward designs were evolved for gaging such essentials as straightness of axis of bore, squareness of bore to face, eccentricity or alignment between the ID's or OD's and averaging of dimensions. These relationships are all determinants of effective and accurate assembly, and the air gage presents the ideal production-type device free of operator in-

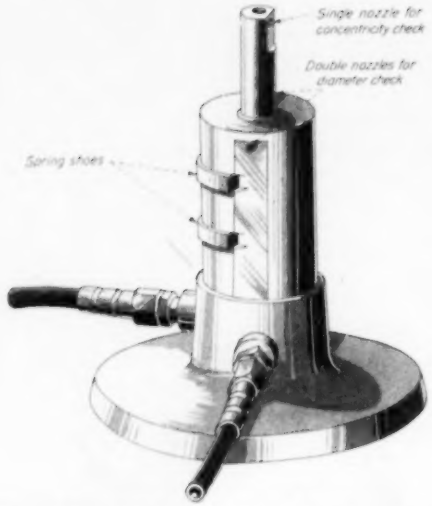


Straightness of the axis of a bored hole is readily checked by a simple plug of the correct dia, with properly disposed nozzles; one at each end and one at the center

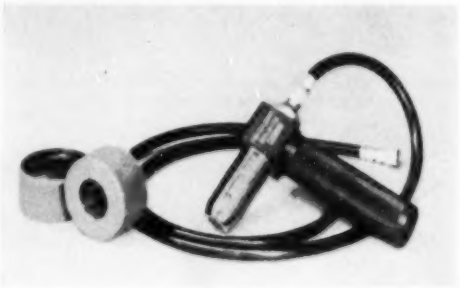

Double nozzles for diameter check
Spring shoe
Lapped locating surface
Single nozzle for squareness check
Two locating beads 120° from each other and spring shoe

Squareness of bore with face, and diameter of bore can be checked simultaneously on a fixture of this type

Average diameter of a bore is indicated on the dial of an air gage of this type without any need for making multiple readings and calculations



Concentricity of two bores of different diameters can be checked instantly with an air gage and suitable fixture



Contact-type air plug gage permits gaging relatively rough surfaces. Some wear may occur on the contact points, but the speed and accuracy of air gaging are retained

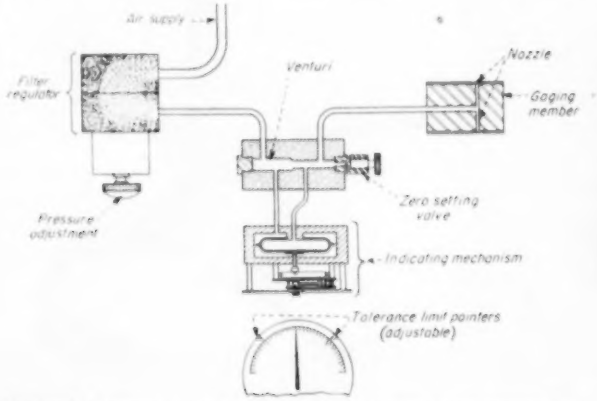
fluence. Further, air circuits have been evolved which perform simple calculations, such as the determination (on a single air indicator) of angle from two dimensional measurements, and the measurement of center distance between bores without concern for bore size. Air gaging also thrust itself into the inspection of multiple dimensions where, by conversion of air impulses into electrical ones, the total part acceptability is obtained in a single indication.

Because of the difficulties frequently encountered in checking dimensions of work on which the finish exceeds 50 mu in., a system of gaging has been developed to employ mechanical contact translated into air measurement. In this type of device, reed-mounted contacts meet the work, and the inner surfaces of the contacts form valves for the air nozzles. Virtually all the advantages of air gaging are retained, with the notable exception that contact is made and that the "no wear" characteristic is thereby lost. Contact gages are made to be largely self positioning and are easy and effective to use. They are a real solution where finishes begin to affect apparent dimension as read on a direct air gage.

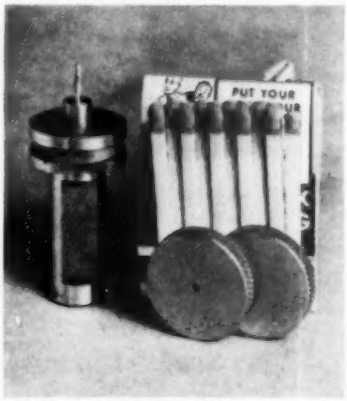
The Velocity-Type Air Gage

A refinement over the original back-pressure air gage is the velocity-type device. Its numerous advantages make it by far the most useful in modern industry. The air metering device is a form of Venturi tube. By transferring the velocity differences in this tube to a sensitive, differential, diaphragm-type indicator, small differences in velocity are readily shown as large changes in dial reading, thus providing substantial magnification ratios.

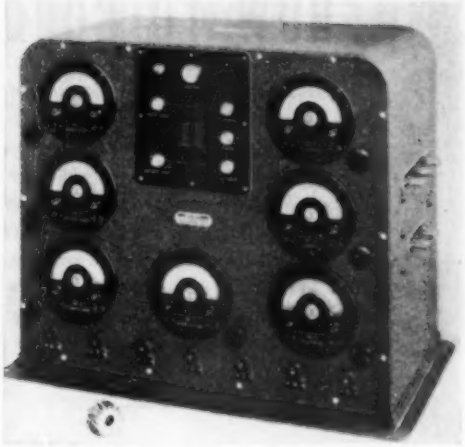
An interesting phase of gage design is the linkage of motion from the air-sensitive diaphragm to the indicating needle. To have present the smallest possible volume of air, and consequently to provide the fastest possible reaction time, the diaphragm chamber contains no mechanical members but is, instead,



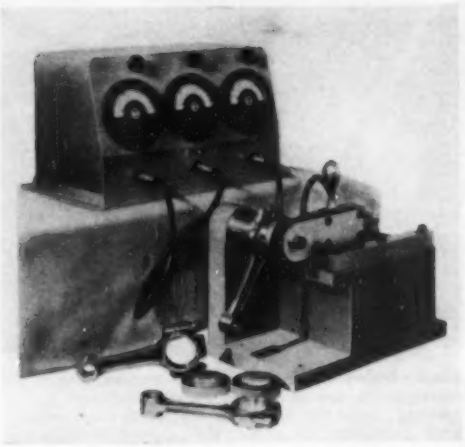
Air circuit diagram of a typical velocity-type air gage. Small pressure differential caused by passing the air through a Venturi tube acts on a sensitive diaphragm connected to an indicating needle



Special gaging plug and master checking rings for a 0.058-in. hole. Air nozzles for this unit are only 0.013 in. in dia



Multiple-point air gage checks seven dimensions simultaneously. Individual signal lights for each dimension are interconnected into master light. Dials also show amount of deviation from standard



Special multiple gage checks hole size, squareness of hole to face, and face thickness of automotive connecting rod. Slide actuates face thickness caliper. Similar setup is designed for gaging small end

linked to them through a small floating seal where, with clearances at the absolute minimum consistent with perfectly free motion, the desired linkage is accomplished with only minute air leakage.

Because dimensioning of gaging member and venturi largely determines magnification, this type of velocity air gage lends itself exceptionally well to easy change in magnification. By substitution of one venturi for another, and a change of dial plates, the proper gaging member will permit a new magnification range to be obtained on any standard unit.

The velocity method of air gaging normally surpasses the backpressure type as regards speed of reaction, particularly when remote gaging is involved. Reaction speed on the latter can be increased, but only at the expense of sacrificing certain other features. The inherent speed of the velocity gage is particularly evident when measuring a small hole, using an extension hose between the gaging member and the air unit. With the necessarily small gaging nozzle size, the velocity device, without need for back pressure buildup, does not suffer materially from speed loss. This ability to utilize extremely small nozzle sizes has made possible the successful application to ID's and OD's as short as 0.025 in.

In addition, velocity-type air gages lend themselves well to flashing signal-light indication. Accuracies of 0.00002 in. in the "breaking point" of the lights can be obtained reliably, and speed of reaction is far beyond that of any indicating meter.

The examples shown here are but a few of the many applications of air gaging, and it is evident that this comparatively new field holds much promise for the future. With the push-button factory an impending reality, the air gage will continue to provide quality assurance to an ever increasing degree.

Tips FOR TOP SHOP MEN

429 Balloons and balloon tempers are both obsolescent. The combination of hot air and potential pop that makes a balloon is one that unmakes a man.

430 A man's greatest love is himself. Thus when you deal in personalities, you deal in trouble. Don't joke about a man's character, poke fun at his appearance, criticize his attitude or otherwise hurt his pride unless your reasons are vital. Even then, it's probably none of your business.

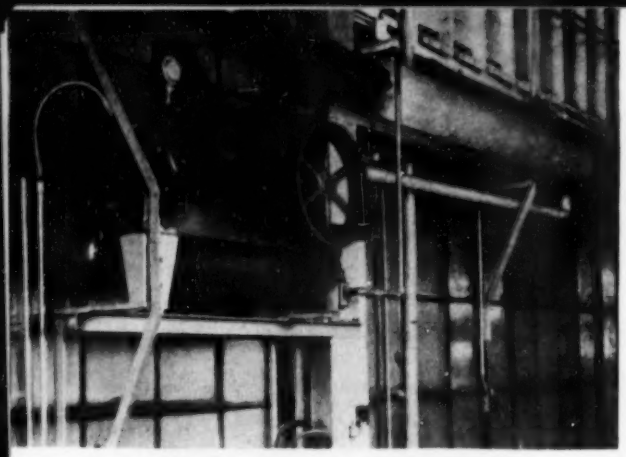
431 Dirty stories are all right in their place, when told by experts—but most tellers make them smutty and crawly. Spare your men's opinions of you by not telling stories unless you are competent. The half-hearted grins a poorly told story gets aren't worth the loss of respect.

432 If your boss doesn't have all he should in your eyes, you can either leave, learn to get along with, or educate him. The third alternative is the hardest, but may be best. If you're sure you're right, and if you're careful, as you help him you help yourself.

433 Recognize authority without toadying. Give the boss priority in service and do things for him the way he wants them done. He's entitled to both, and you can express your independence in plenty of other ways.

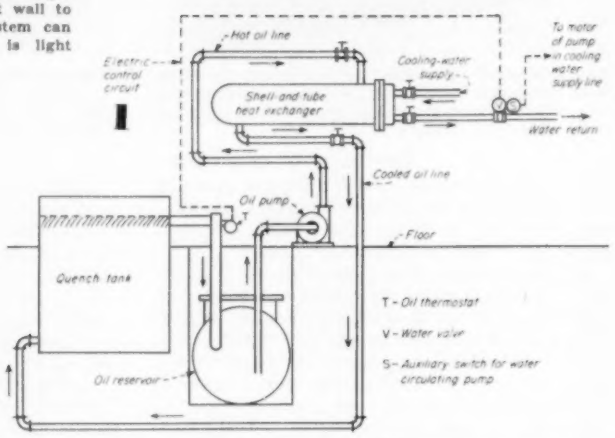
HOW TO COOL

Circulating oil is working oil in heat-treating operations where quenching is done continuously, or nearly so. Good circulation gives an even bath temperature, which promotes consistent results in the metal being treated. It also can keep the oil below its flash point, to prevent fires, and can eliminate evaporation of oil at high temperatures. Here are the general circulating and cooling methods and how they work:

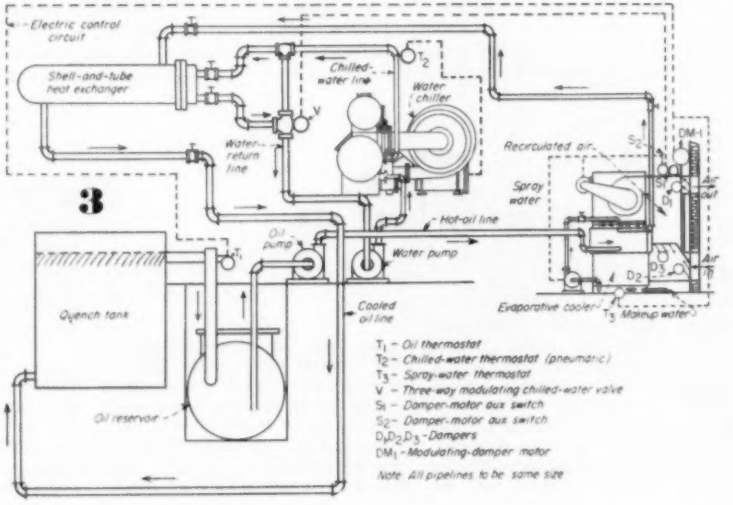


Small refrigerator and shell-and-tube heat exchanger (background) can be located high against wall to take up space not otherwise usable. System can keep quenching oil under 90F if load is light

FOUR TYPICAL COOLING SYSTEMS for controlling quench-oil temperature:



1 . . Small unit operates shell-and-tube heat exchanger from natural-water source, such as a well. Water at 50F to 60F keeps oil at 100F to 150F. Storage tank is not necessary. **2 . . Evaporator cooler** operates where well water is not available, and where outside wet-bulb temperature is under 78F. Make-up water is added from tap. **3 . . Evaporator plus heat exchanger** work together to keep oil temperature in range from 90 to 100F. Refrigerating unit cools oil in heat exchanger after evaporator has precooled it. This system also takes heavier load than first two. **4 . . Heavy-duty refrigerator and heat exchanger** handle continuous quenching load. This arrangement has automatic control to keep oil under 90F



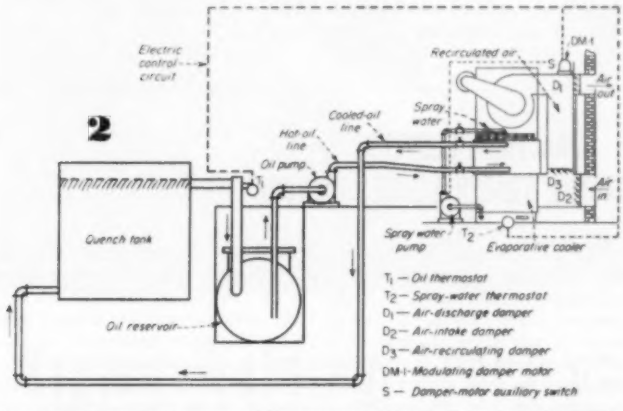
OIL-QUENCH TANKS

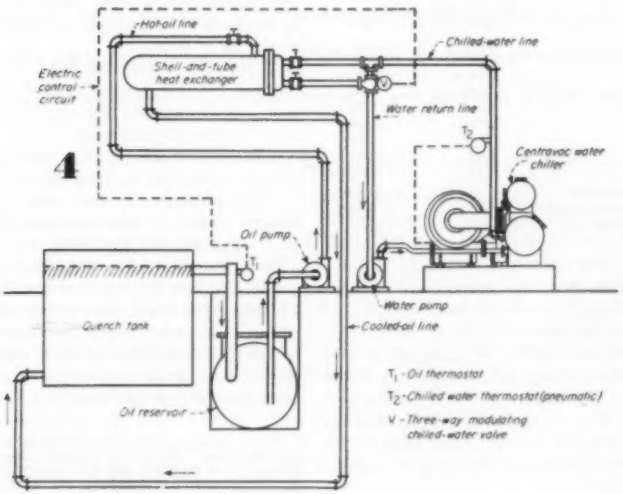
BY C L RINGQUIST, MGR.
Air Conditioning Dept, THE TRANE CO

QUENCHING BATHS generally cool metals at furnace temperatures of 1450F and over down to 100 to 200F. The rate of temperature drop within the metal is all-important, and this is controlled by the ability of the bath to absorb heat and its temperature when the metal is immersed. Such liquids as water, brine, oil, hot lead, and molten salts are used, but quenching oils are by far the most popular.

Unless use of the quenching tank is intermittent, some cooling method must be installed. It must meet these requirements:

1. Capacity to maintain the required bath temperature during load fluctuations
2. Ability to operate the year around, regardless of high outside temperatures or freeze-ups during the winter
3. Simplicity of reheating after shutdowns
4. Ability to precool the liquid if bath temperature is over 165F.





There are a number of different methods of cooling, including shell-and-tube heat exchangers that utilize either natural cold water or refrigerated water, evaporators, and combinations of these.

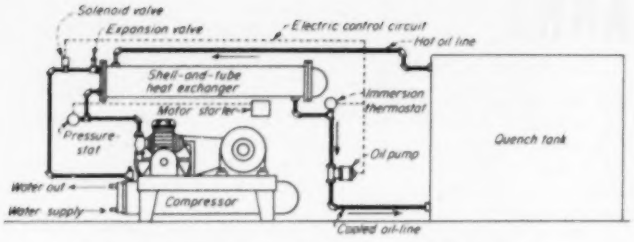
The most economical and convenient cooling system would be the heat exchanger supplied with natural cold water. The quenching oil is pumped from the tank or reservoir through the shell of the exchanger, while water is pumped through the tubes. The water, in this case, is the limiting factor, because dirty, scarce, undependable, or expensive water would indicate a shift to evaporation. If the water temperature is over 75F or the bath temperature is over 100F or so, this system would probably not be the best to use.

With a shell-and-tube heat exchanger, manual or automatic controls can be set to limit the flow of water through the exchanger, while the oil flows at a regular rate. The more water pumped, the more cooling.

An evaporator cooler works with much less water, and the original water temperature is not important. The cooler must be set up so outside air can be piped in and out of the evaporator easily, and ducts should be short to keep fan-power requirements low. The unit should be close to the quenching tank to keep piping and pumping costs low, too.

One point important in any system using water as the cooling medium is that whenever the quenching oil rises above 165F, some method of precooling, such as mixing quenching oil with circulated oil before they enter the cooling system, is necessary. This tends to eliminate liming (deposits of minerals from the water in the tubes).

Quenching-oil baths that can operate at fairly high temperatures, over the range from 100 to 150F, can be controlled by evaporation units using air as warm as 80F (wet bulb) or heat exchangers



Small refrigerator and heat exchanger can handle light loads. This one has piston compressor, but no reservoir for oil

using water as hot as 100F. For cooler bath temperatures, the requirements grow more rigid. Evaporation is generally preferred for the high side of the temperature range, while shell-and-tube exchangers are best for the low side.

But to maintain a bath at under 100F a cool-water source or refrigeration will be called for. This brings in cooling combinations, such as an evaporator supplemented by a heat exchanger running with refrigerated water to hold a bath at 90 to 100F.

In this combination, hot oil from the bath is circulated through the evaporator, through the heat exchanger, then back to the quench tank. The evaporator thus precools, while the exchanger does the main cooling.

If water is plentiful, a second heat exchanger can be operated with tap water instead of the evaporator.

For light-load duty, a closed system with a heat exchanger and a refrigerator can often economically maintain a low bath temperature. No precooling should be necessary. Automatic control can be easily applied.

PRACTICAL RESULTS FROM RADIOACTIVE TRACER STUDIES OF TOOL LIFE

ALTHOUGH the "radioactive tool wear method" has been in use only a relatively short time (*AM*—Dec 24 '51, p100), numerous practical tool life studies have already been made with it.

This method measures the "instantaneous" rate of tool wear by machining with a tool that has been rendered radioactive by neutron irradiation in a nuclear reactor, collecting the resulting chips, and measuring their radioactivity from the particles abraded from the tool during a few seconds of cutting.

In testing the relative tool life with two cutting fluids, for example, three series of tests were made. Each series consisted of three individual 12-sec runs with each cutting fluid. Cutting fluids were alternated after each set of three runs in order to minimize any effect of variation in work material or condition of the cutting tool.

The test was made on tubular SAE 8650 steel, a 0.2000 in. width of cut, 0.0036 feed per revolution, and a cutting speed of 591 fpm. The tool was sintered carbide with 0° rake and 7° relief.

The radioactivity of the chips was checked to determine the counts per minute above the background count (with a Geiger counter) per gram of chips. This is a measure of the rate of tool wear and is inversely related to expected tool life. The cpm/gram was:

	CUTTING FLUID "A"	CUTTING FLUID "B"
	3.65	3.71
	3.54	3.12
	3.49	2.80
	3.40	3.26
	3.50	2.88
	3.79	2.94
	3.34	3.50
	3.55	2.88
	3.23	3.23
AVERAGE	3.50 ± 0.10	3.15 ± 0.21
UNCERTAINTY	± 2.9%	± 6.71%
TOOL LIFE	100%	111%

The uncertainty values are determined by statistical analysis using the conventional criterion of a confidence limit of 95%. This means that in 95 cases out of 100, the average value can be expected to be within the indicated limits.

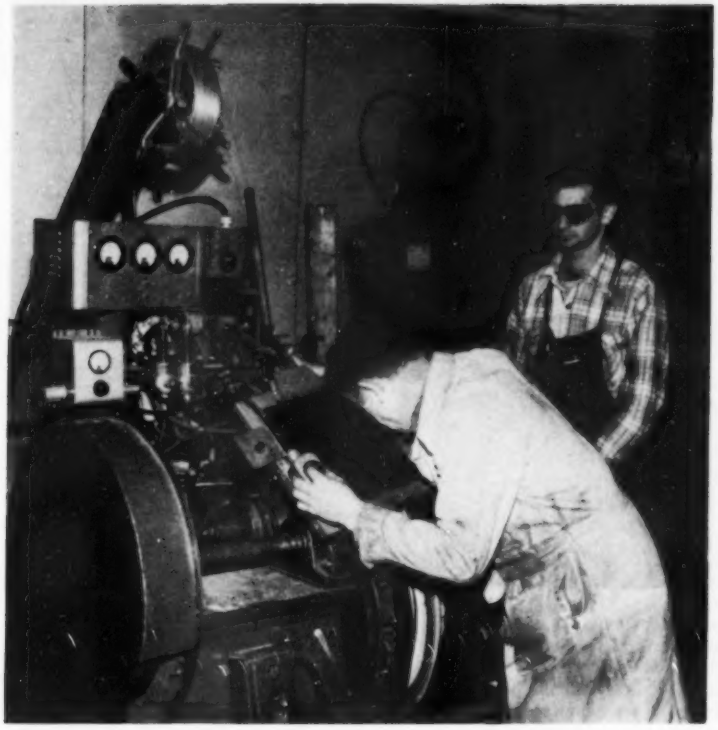
The 11% difference in relative tool life, considered in light of the uncertainty values is quite significant.

In another test of two cutting fluids when machining aluminum with a HSS tool, the expected tool life with one was 4% greater than with the other. However, the statistical uncertainty was ± 8.3%, indicating that in this case there should be no significant difference in tool life in practice. In this test, the cutting fluid was alternated after each run instead of after every three runs.

These tests indicate how the method is now being applied to tool life evaluations for the solution of practical problems.

The method can also be applied in basic research. Autoradiographs of chips produced by the radiation coming from the tiny particles of tool adhering to the chips have shown that the tool wears by a process of continuous abrasion. It has also been found that nearly all of the tool wear products adhere to the chips. Studies of this type should contribute to a better basic understanding of tool wear.

Abstracted from an ASME paper by M Eugene Merchant, Asst Dir of Research; Hans Ernst, Dir of Research; and E J Krabacher, Research Engineer; all of The Cincinnati Milling Machine Co.



SPECIAL WELDING MACHINE was built at Solar Aircraft Company, has welding heads purchased from Linde Air Products Co. With this unit, Solar is developing new techniques and applications for welding with a consumable electrode shielded in inert gas. At top is feed reel for welding wire; below that is electronic equipment; at lower left is Solar-designed drive

Sigma Welding Stars on 3 New Jobs

Speeds up to 10 times those previously possible are being obtained at Solar Aircraft Co on hard-to-weld jobs in three fields in which inert gas welding with consumable electrodes has until now had only limited application

By FRANK HARKINS, Chief Welding Engineer, SOLAR AIRCRAFT COMPANY, San Diego, Calif

Specially designed equipment at Solar Aircraft Company now is being employed for sigma welding of ferrous metals on a high-production basis. Mild- and low-alloy steels, dissimilar metals, and stainless sections as thin as 0.050 in. are welded automatically at speeds up to 10 times those formerly obtainable with manual welding.

Substantial savings also are realized from reduction of electrode costs. Welding wire for the new method costs approximately 32¢ per lb as compared to $1.80 per *M* for manual electrodes. As both the weld and the electrode are shielded by inert gas, there is no flux or slag removal problem. Distortion problems also are minimized because of the welding speeds now possible.

Equipment at Solar is built around two welding heads purchased from Linde Air Products Co, who is licensed by Air Reduction Co, owner of the basic patent. A consumable electrode in the form of electric wire feeds automatically and is shielded by a special grade of argon during the welding operation. Speed is variable, as are current values. Electronic controls permit control of arc voltage within 0.1 volt, which makes the equipment readily interchangeable and adaptable to submerged-melt welding. A quick change of wire feed rolls, plus the addition of flux

WELDING OF DISSIMILAR METALS is required on 18-in. industrial expansion joints made by Solar's Bellows Division. Commercial low-alloy pipe ½ in. thick is joined to a stainless steel bellows 0.078 in. thick. Welding is automatic. Operator observes work through No. 12 welding lens. Eye protection is not essential but operators usually wear No. 3 shade flash goggles

is all that is required. Jigs, fixtures, and work-rotating equipment has been developed by Solar's technical welding group, which also determines speeds, current values, welding wire, size and compositions required to make the process applicable for the unusual jobs now being done successfully.

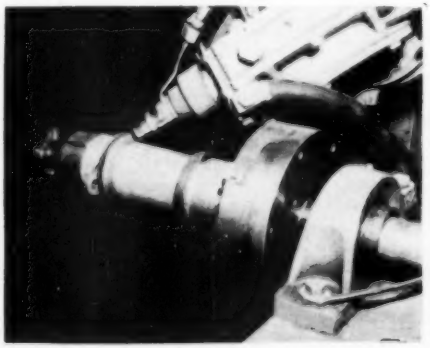
1 ... *Sigma Welding Mild Steel*

Secret of the welding of mild steel lies in the composition of the welding wire. In the past, inert-gas shielded-arc welding has had only limited applications on mild steels, as gases in the steel cause gross porosity and poor welds. Solar has established the chemistry of the welding wire such that sufficient deoxidizers get into the weld to prevent gas evolution and thus to prevent porosity. Chromium, manganese and silicon are employed as deoxidizers. These elements react with the gases to form harmless compounds.

For example: Mild and low alloy steels contain varying quantities of sulphur which is present in the form of iron sulphide. The melting range of these steels is from 2550 to 2750 F. This means that the melting range of a sulphur-bearing steel is extended 750 to 950 F. Obviously such a steel would be extremely "hot short". This is the basic reason why the so-called free-machining steels are not recommended for welding applications. However, through the addition of manganese to the filler wire or to the welding flux, the sulphur in the steel may be forced to combine preferentially with the manganese to form manganese sulphide. In the solidified steel, the manganese sulfide will exist as small harmless globules at the grain boundaries.

Different wire compositions are employed depending on the composition of the metals being joined. In welding the mild and low-alloy steels it is not always desirable to select a filler wire of the same composition as the base material. There are many reasons for this practice. Many of the alloying elements are oxidizable and are, therefore, partially lost in passing across the arc. Many of the carbon and low-alloy steels contain over 0.30 carbon. It is not practical to use a 0.30 *C* filler wire unless special precautions as to technique are employed.

It is accepted practice when welding these materials to use high



WELDING TIP of sigma welding machine is still in position having welded C-54 exhaust system nipple held on expanding mandrel. Operator controls entire welding process with single button

preheat temperatures, post-heating, and heat-treatment after welding. These methods are time-consuming and expensive. If possible, the welding engineer will select a low-carbon filler wire which, through other alloying elements such as chromium, will develop the required physical properties without the necessity of extensive preheating, post-heating, and heat-treatment.

A typical example of this is to employ a 4 - 6% chrome wire with 0.12 to 0.15 carbon content to weld SAE 4130, 4140, 4340 and similar materials. The weld usually may be executed without resorting to preheating. However, if maximum properties of the material are required heat-treatment after welding is necessary. The advantage of using the lower-carbon filler material is that the tendency toward underbead, incipient and weld cracking is significantly reduced by this type filler.

2 ... *Welding Dissimilar Metals*

One of the most difficult applications of the sigma welding process is in the production of industrial expansion joints, made by Solar's Bellows Division. For a petroleum refining assembly, commercial low-alloy pipe is being welded to a dished head to form a compression chamber. The job involves joining stainless to low-alloy steel, and includes joining commercial pipe flange, 18 in. in dia and ½ in. thick, to a stainless steel bellows 0.078 in. thick.

As most welders will appreciate, the problem lies in achieving adequate penetration into the ½ in. wall without "burn-through" of the 0.078 material. The problem is further complicated by the relatively low melting temperature and low heat conductivity of the stainless steel. The answer to this problem lies in the welding technique. By carefully positioning the welding head so the arc stream is directed to the heavy pipe and allowed to "wash" the stainless member successful welding may be achieved. The welding schedule—volts, amperes, and speed—on such application is extremely critical. The time saving of mechanical welding over manual welding on this application is 10 to 1.

3 ... *Welding Thin-Gage Metal*

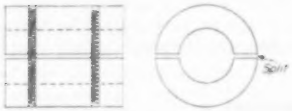
Taird application on which the new sigma welding techniques are out-performing anything previously possible is in the welding of thin-gage metal. In production, 0.050 in. stainless is being welded regularly, and, experimentally, walls as thin as 0.040 in. have been handled successfully. Making this possible is precision tooling. Copper back-up bars plus adequate clamping to insure intimate contact between the thin stainless steel and the copper are usually necessary. Where the quantity of parts to be produced is not sufficiently high to justify such tooling costs, Solar Back-up Flux is employed to advantage.

This flux is a mechanical mixture of unreacted slags which is characterized by extremely high thermal conductivity when fused. This effectively increases the heat conductivity of the stainless steel so burn-through is effectively prevented. A corollary advantage is the complete protection afforded the back of the weld. This is evidenced by the lack of oxidation or discoloration of the metal after removal of the flux residue. Experiments have demonstrated that a 30% increase in the weld energy over the normal level will not cause burn-through or severe oxidation. Through the application of flux, stainless steel behaves much like copper as regards heat conductivity.

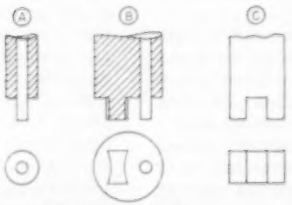
DIEMAKERS KINKS

BY FEDERICO STRASSER

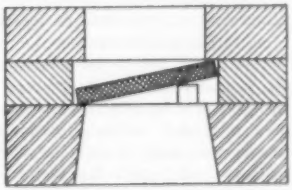
MULTI-PURPOSE bending dies are best made in sections. Two rectangular blocks with the corners shaped as shown, and punches with corresponding angles, provide four different bending angles.



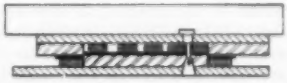
SHANK ADAPTERS must be used if the punch-holder shank of a small die is much smaller than the shank hole in the ram of a large press. Split bushings held together with springs are useful in such cases.



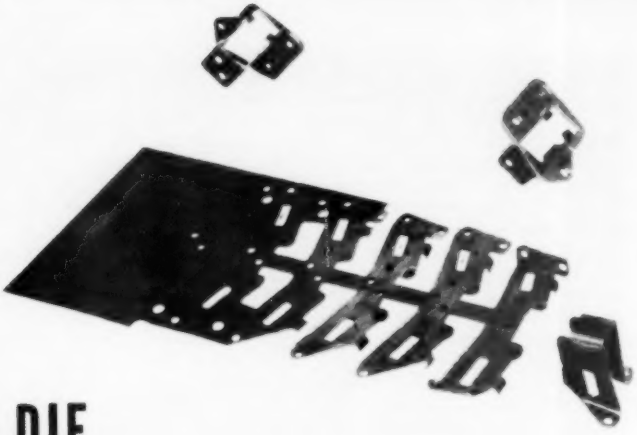
SMALL PUNCHES must be supported to reduce breakage. Small round ones can be put in quills (*A*), incorporated in the body of a large punch (*B*), or joined to a nearby small punch (*C*).



STOP PINS for manually fed dies are best located to one side of the strip. This practice facilitates feeding. By lifting the corresponding edge of the strip above the stop pin, the blanked opening will pass over unhindered.



STRIPPERS made from rubber blocks or disks are satisfactory for short-run or experimental dies, where the tools are of limited height.



6-STAGE PROGRESSIVE DIE FORMS HEAVY STOCK

Channel-shaped stamping incorporates six bends and two offsets. In subsequent operations, a faceplate is welded in place and further presswork finishes the piece.

Progressive dies are not limited to small, thin-gage articles. Here is a tool that is indicative of the trend toward making large, heavily formed parts from wide, thick strip in order to save press setups, labor and inspections between operations

HEAVY forming operations on 5/52-in. stock are unusual in progressive-die work. But the Atlantic Manufacturing Co., Philadelphia, built two 6-stage progressive dies for the channel-shaped member of an automobile door hinge box, and also supplied the second-operation tools required. Atlantic Manufacturing is a member of the National Tool & Die Manufacturers Association.

The hinge box is the channel stamping carrying the pin on which the door hinge turns, and forming the pocket into which the hinge swings when the door is closed. Being a structural member bolted to the door post, it must be a stiff, rigid stamping, because it supports the weight of the door when open and takes much of the shock when the door is slammed shut.

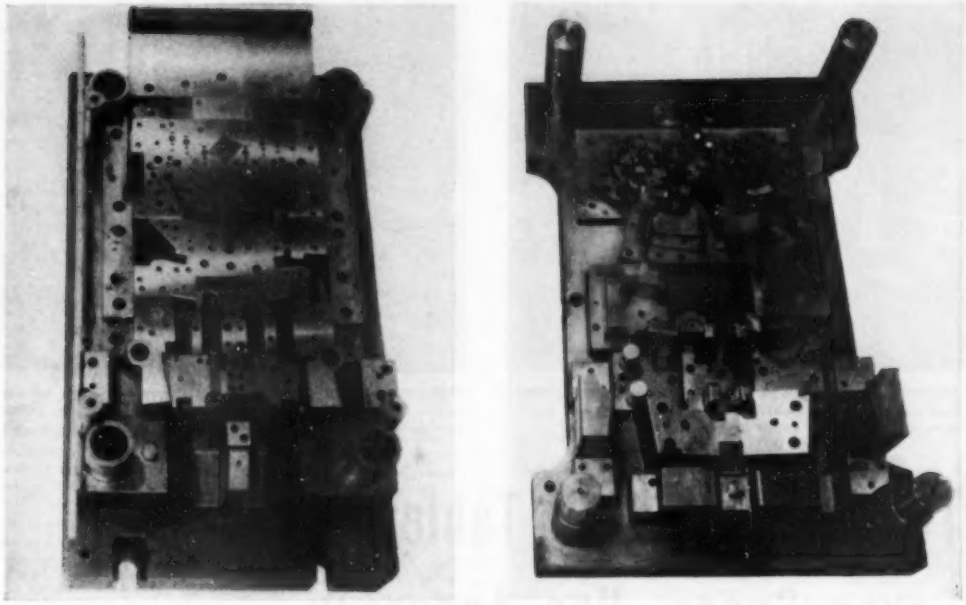
The stamping as made is a channel section with attaching ears, six bends, two offsets, eleven round holes (three of which are die countersunk), two rectangular cutouts, and identification stamping showing the customer's name and trade-mark in one place, and the patent number in another. Subsequent to the making of the part in the tool, it is restruck to set the formation and welded to a second part which forms the faceplate. The hinge-pin holes are over-pierced in line ready for assembly with the splined pin. Bearing surfaces for the hinge are shaved in a broaching die to get a suitable finish. Finally, the hinge is assembled to the unit with its hinge pin to form the final assembly.

The part is made from coil stock, 5/32 in. thick by 15¾ in. wide, fed by suitable coil handling equipment and automatic feed mechanism. The job is run on a single-crank column press. One completed piece drops off the end of the die onto a conveyor at each stroke of the machine. Slugs and scrap drop through holes in a special bolster for transportation to scrap baling equipment. No part of the scrap strip comes out at the end of the die. The part is trimmed completely around prior to the forming stations.

Because of the weight and stiffness of the coiled stock, the die was designed to feed the stock through on a single level, with the various formations being cleared in the die as the stock is advanced. Design of the part is such that the various bends are not parallel to each other. Hence, it was necessary to use cam-controlled stations where the outside mounting flanges were formed, so that the stock could be pushed forward without interference between strokes. Right-hand and left-hand dies were constructed, each in duplicate (a total of four dies). In order to keep the "French" stop which controls the advance visible to the press operator, the right- and left-hand dies are not physically exact opposites of each other.

SEQUENCE OF OPERATIONS IS:

Station 1—Pierce all holes, including two pilot holes in the scrap. The eight smallest holes are



Dies were made in duplicate. Sectional die construction was used, and the precision had to be held equal to lighter tools

pierced in steel inserts, and spare parts are available, made in jigs so as to be interchangeable. At this station the edge of the stock is notched to control the advance. The two rectangular spring slots are also pierced.

Station 2—The stock is picked up by two pilots, and the blank is partially cut out, leaving a 1¼-in. carrying strip along the centerline.

Station 3—The rest of the blank outline is now cut out, completing the outside shape of the part.

Station 4—The two depressions are formed, and the two 1-in. tabs are bent down. Since the two pilot holes have been blanked out, the strip is now gaged by fingers in the upper die which straddle the blank outline itself. Also, the three flange holes are countersunk at this time.

Station 5—The part is now partly bent into a U-shape, with the outside flanges formed to their final angle. In this station the outside forming blocks had to swing out of the way to allow the negative angles on the outside of the part to clear. The strip is still being positioned by fingers which straddle the blanked shape.

Station 6—The part is now completely U-formed, and at the bottom of the stroke the connecting rectangle of metal is blanked out, leaving the stamping clear. Advance of the stock pushes the formed piece off the ramp onto a suitable conveyor.

These dies are outside of the normal die construction. In order to make a precision die, operating with coil stock and an automatic feed, it was necessary to make the sectional-die construction with the precision of a die for much lighter stamping. But heavy sections of steel had to be used, set in the die shoe, and well backed up to take the smashing shock required to cut the heavy stock. Since dies were to be made in duplicate, the sections of the die had to be made in duplicate. In case of failure, a section could be readily replaced. Punches were of a commercial type made with standard retainers and readily changed under the press. The sections containing the piercing holes were made in jigs.

Because of the function of the part, some shapes and locations were critical, and had to be held accurately after forming. Much of the work was calculated by common bending rules, and proved in temporary dies prior to actual construction. Even after construction, it was found that the shock of heavy cutting, swaging and bending operations tended to warp the hole locations. After these were corrected on the first die, it was found possible to build the other three dies and run them without much trouble. High-carbon, high-chromium die steel was used throughout.

Because of the very high production requirements, the customer required the dies to be constructed so that punches or die sections could be replaced while the die was actually in the press. A further provision was made so that the lower die steels could be removed as a unit for grinding when the die was not running. The steel parting was arranged to break the lower die into two units small enough for the grinder travel to cover. The two units had to go back together in perfect relationship.

POSITION 1 . . Loading is performed without danger to operator from rotating spindles. Hoist can be used conveniently on heavy parts. Carrier rolls on wheels to forward position

POSITION 2 . . Carrier on which jig is mounted locates against positive stops, is locked in forward position. During drilling, carrier rests on support posts, avoiding pressure on wheels and rails

Two-Position Drill Table Saves Space, Ups Accuracy

BY A. V. JENSEN, Supervisor of Tool Engrg., Peerless Pump Div., FOOD MACHINERY & CHEMICAL CORP., LOS ANGELES, CALIF.

In an extensive tooling program, recently undertaken, we were faced with the problem of developing accurate work-holding methods on our multi-spindle drillpresses. Accuracy was important, not only because of the tolerances on the work, but also to eliminate excessive tool wear. After drilling, bushings and setup are changed and the holes are reamed. Clearance in the reaming bushings is only 0.0005 in. total. Jigs, therefore, must be located accurately beneath the drill spindles to avoid deflection of the reamers and consequent rapid wear of reamers and bushings. Reamers are carbide and represent a considerable tool investment that must be preserved. Furthermore, misalignment means rapid depreciation and loss of accuracy in the fixture as the carbide is harder than the tool steel bushing.

In addition to obtaining accuracy, we also wanted to perform the loading operation clear of the machine spindles. This is much safer for the operator and permits the use of a hoist in loading heavy pieces. At first, the solution seemed to be a large indexing table. However, the press on which the work was to be done has 24 spindles and we wanted to be able to run all 24 at once, either in a single 24 x 36 pattern, or in sets of 12 on each of two pieces.

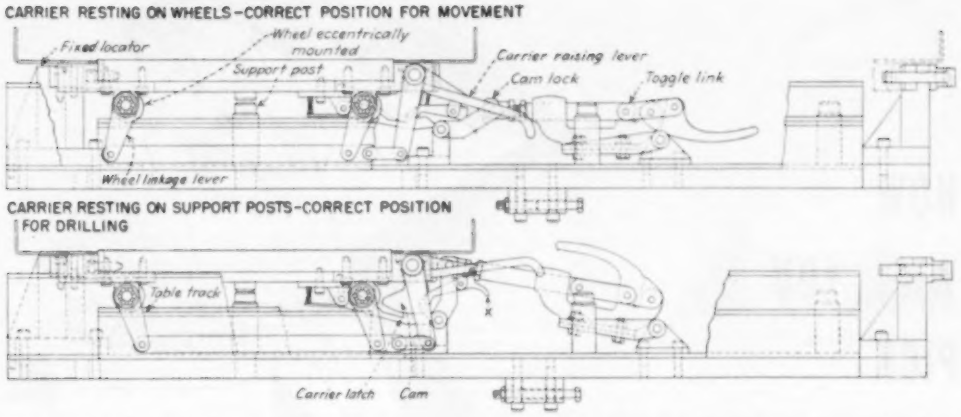
To meet this requirement would necessitate an indexing table at least 54 in. in diameter. A table of such size would be heavy, slow indexing, and liable to inaccuracy both from the repetitive impact of indexing, and the danger of rebound. We also would have to remove the entire elevating table assembly provided with the press, and substitute a very large and heavy special sub base. Vertical adjustment would no longer be possible.

Design Reduces Wear, Lengthens Tool Life

To overcome these limitations, we developed a special two-position worktable that occupies less than half the space of the proposed indexing table, provides positive location every cycle, and is designed to take the full cutting thrust on hardened support posts, rather than on the wheels of the moving carrier on which jigs are mounted. With this design, wear is reduced and the accuracy built into the tooling will be maintained indefinitely.

The unit is mounted on the standard drillpress table which can be raised or lowered to the best height for any particular job. Jigs are attached to a movable carrier that travels on ball-bearing rollers between the loading and drilling positions. Shielded ways avoid trouble from chips.

At the drilling position, two positive stops—one flat, the other a "V"—are engaged by mating surfaces on the carrier. The carrier then is locked in position by a mechanical toggle that acts against a hardened compression pad. The toggle is designed to lock at the top of its throw, so there is no upward or downward force produced by the locking action. In this way, the table is bound to come to the same exact position each time.



LIFTING AND LOCKING MECHANISM . . Carrier travels on wheels mounted on eccentric shafts actuated by wheel linkage lever. Wheel shaft is keyed to linkage lever. With linkage lever in forward position, upper view, wheels support weight of carrier. In lower view, eccentric wheel shaft has been rotated upward, raising wheels and, in effect, lowering carrier onto support posts. Toggle, which locks carrier in position for drilling, is shown in released position, upper view, and in closed position, lower view

Details on how the mechanism operates: Carrier raising is done by two levers, which are necessary for heavy loads. Right-hand lever only is fitted with trigger *X* and segment of cam. Small spring shown on trigger is a tension spring. Spring on carrier latch is a compression spring. When carrier-raising lever is depressed, segment cam is engaged by carrier-latch. Carrier thus is locked in "up" position and is free to roll. To lower carrier, first depress carrier raising-lever further, pull trigger which forces locking-latch out of engagement, and slowly allow levers to rise and carrier to lower. Segment cam, carrier-raising levers, and long wheel-linkage levers are all keyed on a common shaft.

As a matter of interest, we tried the following experiment: We attached a magnetic base to the carrier and a dial indicator was brought into contact against the vertical rails of the drillpress. The carrier was retracted from the work position, run forward and locked in the work position several times, and,, in each case, the indicator came to zero

Before the carrier is locked in position, the operator raises the lever controlling the carrier wheel-linkage. This rotates the eccentric pins carrying the wheels, thus lowering the carrier onto six hardened and ground support posts in the base beneath the carrier. Corresponding support buttons on the underside of the carrier contact the support posts. These are so spaced as to provide positive support during the drilling operation, eliminating deflection and possible distortion of carrier wheels or the ways on which they operate. This is important in multi-spindle tooling as combined drilling pressure could be as much as 22,000 lb if the maximum size drill were employed in all spindles.

After drilling, the operator releases the toggle lock, raises the carrier to its wheels and withdraws the carrier to the unloading position. Here a latch automatically engages the carrier to hold it in the rear position. Again, the operator lowers the carrier to support posts—four being provided at this position. Support posts in this case permit removal of the drill plate and workpiece and allow the operator to use wrenches and perform heavy loading and unloading without danger to wheels or rails.

In connection with this project, a spindle locating plate was developed to provide accurate alignment between spindles and drilljig bushings during the setup. If drills are aligned only by inserting them in the drilljig bushings, drills can be considerably out of alignment and still be rotatable within the bushing. However, this may result in the drill walking off, with subsequent dulling of the drill, wear on the bushings and erratic results in the workpiece.

Spindle Locating Plate Speeds Setup

The spindle locator consists of a plate in which each hole of the hole pattern required for the job is bored 0.001 in. larger than the body diameter of the spindles. The OD of the plate then is machined down so only semi-circles or scallops remain on its periphery. Attached to a suitable mount, the plate then is set up as high as practical between the spindles. All spindles then are moved into position around its perimeter, locating in the semicircles. Initially, two opposite spindles are brought into light contact with the locator and are clamped. All others then are brought into position and clamped. This procedure gives a very accurate location, yet setup is fast. The jig is then positioned relative to the pre-set cluster and secured to the carrier.

To obtain complete flexibility in setup, all jigs are designed to work on the new two-position table, on an indexing table, or on standard radial or multiple-spindle drillpress tables. When two jigs are provided for any job, they are made as exact pairs. All jigs also have two metal bands fastened to the top surface of the jig plate inside and outside the circle of drill bushings. These bands form a trough in which coolant flows to all drills without individual piping to each drill.

HOW WILL YOU PICK YOUR ASSISTANT?

Will you just draw a name from a hat, and spend the rest of your days wondering why things never go right? Or will you go about it in a thoughtful, logical manner? Here are some well-thought-out ideas to guide you in making your choice

BY ALFRED M COOPER

HAVE you just been made an executive or supervisor? Have you just moved to a new job? Your first responsibility is to pick a chief assistant. This may be your most important task.

The characteristics and native ability of this lieutenant will largely determine how far you can go in delegating authority to him, and thereby relieving yourself of detail. If the second man is the right man, you can leave yourself free to give more time and thought to vital administrative functions.

If the second man is not the right man, then you'll never be able to trust him with detail, but must forever be checking on his work to overcome employee dissatisfaction, diminished production, and all those other evils that accompany improper supervision. As every executive knows, you can delegate *authority*, but you cannot delegate *responsibility*.

Remember that the appointment, once made, should be permanent —at least until you are "kicked upstairs." This means that employees must always know who runs things when you're not there.

This permanency is an excellent thing—provided the second man is right. If you choose well, the department will function as smoothly in your absence as when you're there—the mark of the successful executive. On the other hand, it can become something of a nightmare if production rates and employee morale drop sharply every time you are out.

Where does the trouble lie? Does this assistant possess defects that can be readily corrected, or have you simply made a poor choice?

In the former case, you can go to work on your lieutenant and try to straighten out his shortcomings in supervisory technique. But you had better do this in a hurry or the department will be demoralized.

Trouble Ahead

Upgrading a second man is not too difficult, provided he is essentially sound, and his errors have been committed through ignorance, rather than by intent.

When trouble develops in your absence, you will almost certainly hear of it from a number of sources when you return. The second man may tell you a sad story of lack of employee cooperation, or individual employees may drop dark hints that if they are going to have to report to that so-and-so, they are going to begin looking for other jobs. Sometimes your secretary may have a word to say about what has upset the working force.

If the second man's deficiencies happen to be the common ones of overzealousness or a swelled head, your job may not be too difficult. Usually, a good talk, sprinkled with a few instances in which you, too, had difficulty in getting cooperation when you first became an executive, will suffice.

Sometimes, you may have to hit hard, particularly if you feel he needs taking down a peg. But you must know how to do this without incurring his lasting ill will.

Intentional Dissension

Errors in supervisory technique are excusable as long as they are

the result of ignorance of administrative practice. But what are you to do if you are convinced that your assistant is taking advantage of your absence to create dissension deliberately? In other words, what to do if it becomes evident that the second man is disloyal, or seizes these opportunities to vent his spite on certain employees he doesn't like?

This is one of the most difficult administrative problems. If the faults are not caused by ignorance, but by an irremediable lack of the qualities of a good supervisor, there are only two courses of action.

The first is the necessity of replacing the second man. The second is to leave matters as they are, and hope for some change for the better.

Each solution has its drawbacks. If you relieve the second man of his duties as assistant, what are you to do with him? If you return him to a routine job, almost certainly he will hold bitter resentment against you, and particularly against his own successor. Also, he probably has many friends among the working force and may well stir up dissension among them.

Most executives agree that, once the second man is removed from his job, he must be removed from the department, and probably detached from the company's payroll.

The seriousness of this step has led many an executive to hesitate before making such a decisive move. He reasons that the selection of this second man was his own doing; that in demoting or firing him outright he is admitting that he is a poor picker. Moreover, he much dislikes submitting his assistant to a severe setback, resulting partly from his own haste in appointing an unqualified man.

A clean cut is favored

Consequently, the executive may fail to take any action whatever. Hoping that the second man can somehow change his spots and, fearing the results to them both if any drastic action is taken, he may just let matters drift along for years. In one instance, this situation continued for 20 years. Then the executive died, and the disloyal assistant took over the boss' job.

Executives who favor the use of surgery in such cases recommend that the erring second man be discharged outright, and that any resulting unrest be dealt with firmly, but with fairness and understanding. They feel that, for the good of the organization, it is better to clean up a bad mess as quickly as possible, and then heal any wounds such action may entail, rather than endure a situation that must increasingly impair employee morale.

Making the Choice

There appears to be two distinct schools of thought as to how to proceed to pick the right man. One school contends that it is better to rotate the subordinate supervisors, placing different ones in charge of the department during the boss' absence. By so doing, it is felt that there is a better opportunity for judging the administrative capacity of each supervisor, leading eventually to the selection of the best one for a permanent appointment.

Other executives, however, object flatly to this procedure. They believe that confusion results when different supervisors take over at different times, and that it is much better to appoint a second man at once. Then, when the boss is absent, everyone knows who is in charge and automatically turns to him. They also feel that this avoids rivalry between subordinate supervisors, who may fail to cooperate with one another as long as they feel they are rivals for the job ahead.

Because there are no tests to determine in advance exactly how

Has he the necessary qualities?

any supervisor will react when given additional authority, you must give serious thought to the matter before publicly identifying your chief assistant.

You should determine the qualities that must be possessed by the potential second man, and analyze each prospect to see how he rates in them. The qualities may vary. For example, aggressiveness may be extremely important in the makeup of an assistant salesmanager. But in general, certain qualities of leadership must be possessed by any aspirant to the job of second man. As an absolute minimum, he should rate well as to intelligence, integrity, forcefulness, fairness, loyalty, kindness, knowledge of work, and health.

Intelligence may be evaluated by an IQ test, and there is no doubt that a second man should rate highly in this. The work force likes to report to a smart man. However, there are many extremely intelligent men and women who lack the other qualities. Sometimes a supervisor may be too smart for his own good—scintillatingly intelligent, but a thoroughly unpleasant individual.

Integrity cannot be measured by any applied yardstick, yet you must determine from contacts with prospective second men, which one has the courage, steadfastness, and desire to do the right thing rather than merely the expedient thing. Subordinates trust the supervisor who can always be relied on in time of stress—and you, too, may put faith in such a man as an as-

sistant, particularly when things are not going well.

Forcefulness is excellent, as long as it does not include hardboiledness. When the assistant is in charge, he must have the ability to issue orders so they will be obeyed without question. He must also be able to administer a reprimand that will get results. Lack of forcefulness may breed disrespect and lead to a weak type of supervision that creates confusion.

Fairness may be assessed in a potential second man only by observing his methods of dealing with subordinates. He should refuse to play favorites or have pets. Fairness is not a natural human attribute, because most of us favor certain people or schools of thought. But unless the supervisor has somehow developed a judicial attitude in his dealings with subordinates, he will never make a good executive and should not be chosen as second man.

Loyalty, to his company, to you, and to his own subordinates is essential. Unless he has this, the assistant may actually doublecross you, or refuse to defend his own company when it is under attack. A disloyal second man is not worth much, and you must spot such tendencies before raising a man to executive rank.

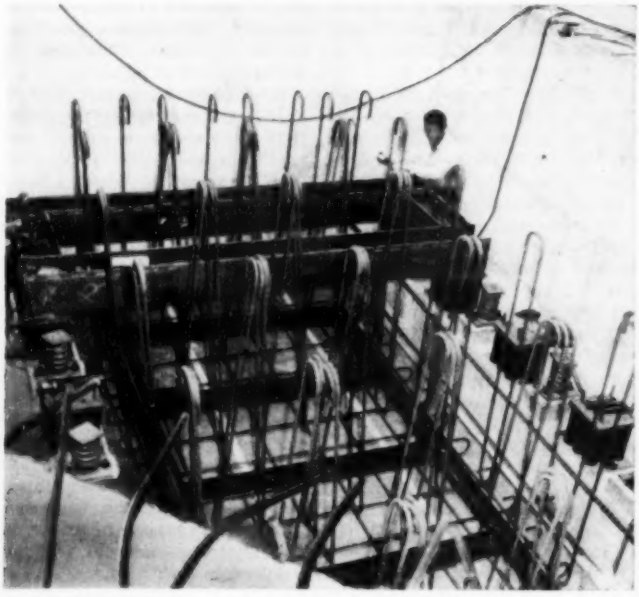
Kindness is essential, and its presence or lack must be ascertained before an assistant is confirmed in his new job. A supervisor may be forceful, yet kind. He may be strictly fair and impartial, yet temper judicial square-dealing with a friendly attitude. On the other hand, kindness can be overdone. Be on the lookout for a second man who can exhibit genuine kindness to subordinates without giving the impression of being weak, conciliatory, or wishy-washy.

Knowledge of work generally may be taken for granted, provided the second man has been employed within the department for several years. Sometimes, this knowledge may be a bit lopsided, and you may have to inform the assistant regarding the duties of all employees, and the function of the department as a whole. This happens when the new assistant has spent years as boss of a single department, and is not too familiar with the functions of the other departments in the division. Unless corrected, this may lead a second man to favor his old department at the expense of the others.

Health is, of course, highly important, particularly if you need a strong assistant who may be depended upon for continued, unfailing effort in periods of emergency. The second man should be expected to take much of the burden of administration off your shoulders, and this calls for dependable health, stamina, and vigor.

Too much stress cannot be laid upon the importance of making a proper choice. Not only will much of your own success and peace of mind depend upon the man you have selected, but he, too, will one day head up the department and will probably continue to report to you after you have been promoted to a higher rank. Thus, the work of the erstwhile second man will continue to have a direct bearing on your success.

HAMMER ISOLATION—REVISED METHOD



A REVISED METHOD of suspending inertia blocks for drop hammers has been developed by design engineers at Ryan Aeronautical Co, San Diego, Calif. In the former method (*AM*—Oct 16, '50 p136) Korfund spring isolators were placed on all four sides of the block with steel I-beams passing through the block at right angles.

In supporting a Cecostamp at Ryan, two rows of isolators are used with six wide-flange I-beams placed parallel and extending from the block to rest on the isolators. The change is said to provide easier maintenance and reduce the chance of shearing the block.

Instead of placing the beams along the bottom of the concrete inertia block they are cast near the center of the block. A framework of channel steel at the bottom is tied to the beams by long eyebolts to prevent the bottom portion of the block from shearing.

ALCO TOOLING ASSEMBLES THE M-47 HYBRID

BY E. J. TANGERMAN, EXECUTIVE EDITOR

American Machinist SPECIAL REPORT NO. 318 TO THE METALWORKING INDUSTRIES

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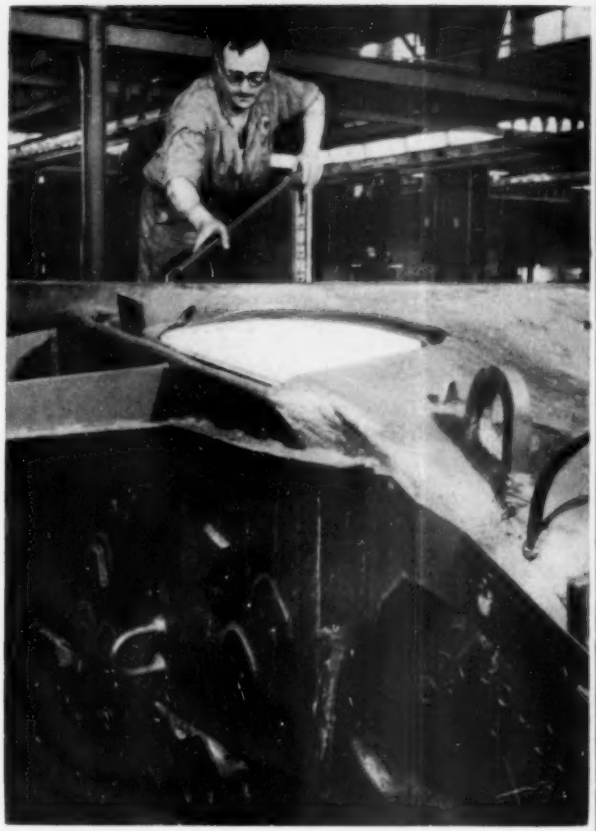
Four months ago, the US Army unveiled its new medium tank, the 48½-ton M-47. It is a considerable advance over its predecessors, with higher road speed; a high-velocity, 90-mm gun; an automatic range-finder; and a compensator to bring the gun back on target after a shot (in earlier tanks, the gunner must re-aim, losing precious seconds in a tank duel).

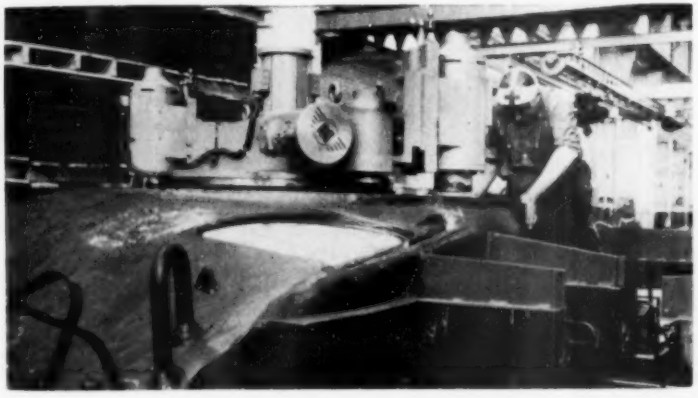
The M-47 was a gamble. When the Korean War broke out, the Army had the old Patton, rapidly becoming obsolescent, and a new but untested T-42 medium. The Patton had an excellent chassis and engine, the T-42 the new turret complete with rangefinder and compensator. Ordnance compromised in the emergency by wedding the T-42 turret to an improved Patton hull, and ordering the hybrid into production without testing. The guess was that modifications would be minor. Detroit Tank Arsenal and a new tank plant, converted from steam-locomotive shops of American Locomotive Company in Schenectady, both began to assemble tanks.

Bugs showed up in the turret mechanism, so engineers went to work on them while tanks piled up. Now the bugs are out, modifications are being completed on the backlog—and we have hundreds of finished tanks. The gamble to short-circuit testing time has paid off.

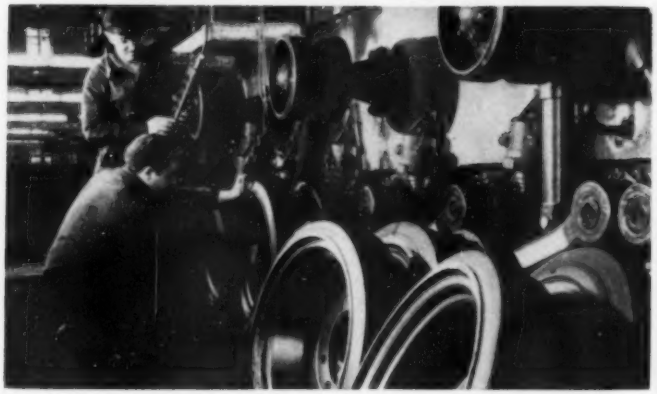
An editor of *American Machinist* has been privileged to go through the Alco shops, selecting unusual and interesting operations. These are pictured and described on succeeding pages. Assembly is done along a conveyor, perhaps the heaviest product ever thus assembled. 24 stations (plus sub-assembly bays and lines and a turret line) are arranged so three cycle times—the fastest double the slowest—are possible simply by altering crew size. An earlier article (AM Oct 30 '50, p 108) described hull-modification work at the Detroit Tank Arsenal.



INCOMING HULLS (AM June 25 '51, p 148), welded and rough-machined assemblies of steel castings and plate, are inspected at Station O. Turret-ring smoothness is checked with a sweep indicator gage. It is located and clamped in the ring opening with a tripod spider, then the triangular arm is swept around to indicate how much grinding is necessary—and where—for the ring to meet specifications. Closure for the operator's hatch is plywood, to mask hull wall-thickness



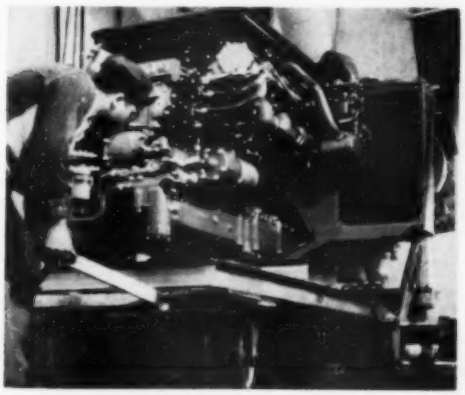
TURRET RINGS are ground with a double-arm grinder built by Standard Electric Tool Co. Motorized heads are mounted on vertical slides, which in turn are horizontally adjustable also. The grinder rotates on a center pedestal on a spider bolted to the under side of the ring. Proper functioning of the entire fire-control apparatus depends on exactness of this turret-ring grinding. Operator is wearing a face mask or shield



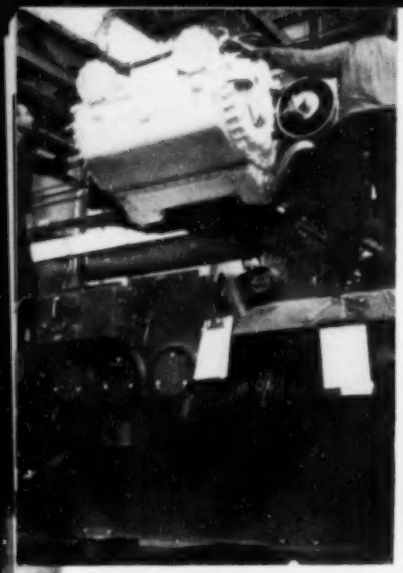
FINAL OPERATIONS at Station O are to install the torsion-bar suspension system and road wheels. Parts are lifted into place by electric hoists with tongs, fastened by air-impact wrenches. These are actually the initial assembly steps. Hull, delivered to Alco by flatcar or trailer truck, is placed on large horses by overhead crane. Road arms, torsion bars, bumpers and shock absorbers, support rollers, compensating idler wheel and road wheels (rubber-faced—AM, June 23 '52, p 106) are applied. Complexity of operations here make this cycle the longest in the tank-assembly process

FROM STATION O, the hull is picked up by overhead crane and set broadside on a dolly at the end of either of two parallel lines. Dollies are on tracks and are pulled along periodically by an underfloor conveyor, the interval depending on cycle time. Facing stations on the two lines are identical, and each has its own feeder bays or storage areas extending each way from the center. Here is one of the subassembly bays (feeding Station 6), where the puzzle-shaped left-hand gas tanks are tested, then supplied with valves, gas lines, and other elements

STATIONS 8 & 9 finish ammunition racks, install seats, bulkhead doors, air cleaners and make further electrical connections. Station 10 installs and pipes the fire extinguisher, Station 11 installs final electrical equipment and cleans and paints the inside. Here at Station 12, the power pack goes in the rear, plus air cleaners, brake rods, and universals (Openings retouched to hide armor thickness). A special 3-arm hanger with cables handles the pack

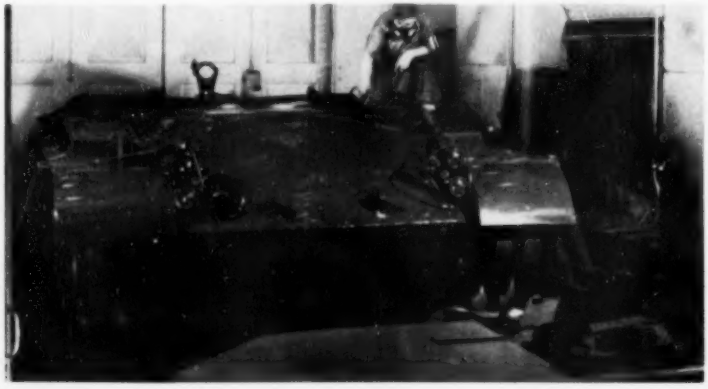


POWER PACK, an 810-hp, V-12, Continental, air-cooled gasoline engine with Allison cross-drive transmission, is readied for installation at Station 12. All accessories are included, so pack can be test-run on block here at beginning of service bay. Note five twin rubber-tired wheels on dolly. Along the main assembly line, such major components as final drive and electric harnesses are applied at Station 1, plus grill doors, lights and personnel heaters; Station 2, handles fenders, stowage boxes, brake and bilge pump; Station 3, driver and gunner hatch doors, transmission and shift controls; Stations 4 and 5, wiring, periscope and gun brackets

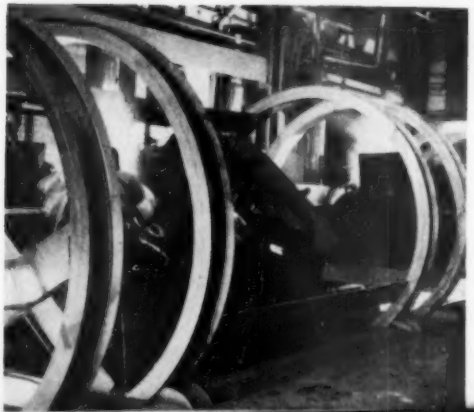


HULL-CARRYING DOLLY and removable grilles which cover floor conveyor may be seen in this view at Station 12. Drive sprockets, idler wheels and ground-contact telephone box are readily visible on the hull. White block on power pack is cross-drive transmission, which includes brakes and steering, both servo-operated. At Station 13, exhaust pipes, shroud, muffler shields, deck grilles, first-aid and telephone boxes go on, while Station 14 is devoted to final inspection and any minor rework or modification. This ends the dual assembly line—remaining operations are not duplicated

REAR-DECK GRILLE, which covers the engine compartment, is also a sub-assembly of steel castings and structural parts. It is assembled with power wrenches, then placed on the hull at Station 13. This is the first station on the cross conveyor; cycle times are half those on the main hull line. Tanks move headfirst along this line, on their own wheels for the first time. Just in front of operator's hands at left is gun travel lug



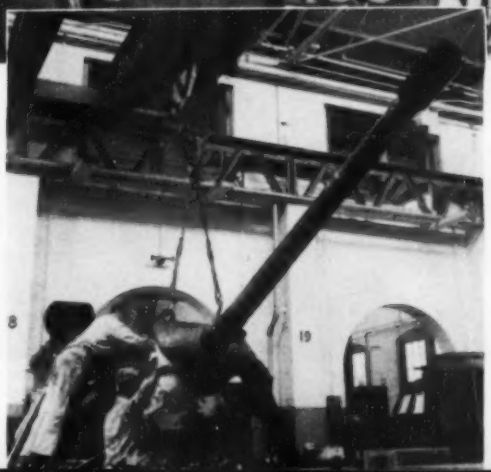
SPRAY PAINTING is done at Station 16, in a special large inclosed water-wash booth actually located just inside the turret-assembly bay and flanked by an open booth where turrets are painted. Both have water streams for vapor removal. Elaborate masking and unmasking are required. Note T-bar on floor along which road wheels are guided. At Stations 17 to 22, this hull will receive its turret, complete with 90-mm high-velocity gun, fire-control apparatus, and other equipment. Towing shackles and escape-hatch covers (hull bottom) also go on here



ROLLOVER JIGS are used in welding and grinding modifications on cast-steel turrets. The entire turret can be rolled over and worked on, either from above or below. Most operations are minor, but an oven is available for preheating in winter if major welding must be done. The turret has been the major "mod" problem; it is a new design while the hull is a modification of that used on the battle-tested General Patton tank

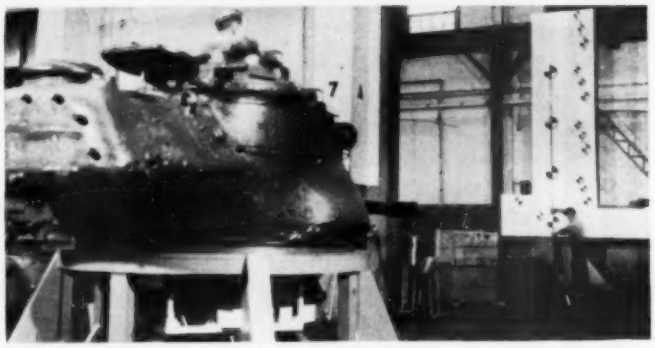
OLIVE-DRAB PAINTING is done when turret welding and grinding modifications are complete. An open-top booth permits crane handling. Here can be seen the gunner's hatch (left) and the tank commander's hatch. Openings at front have been blanked out to avoid showing armor thickness. Studs at rear end eventually support a bustle box which carries tankmen's sleeping bags and other living equipment. A 50-calibre machine gun for anti-aircraft use can be set on a mount later installed at the top center of the turret and operated by the commander

PART SUPPLY is readily visible in this general view along the turret line. All handling, except tote boxes, is done by overhead crane. Each turret is carried down a moving assembly line (since this picture was taken) on its own frame, to which the turret body is bolted. This frame provides clearance for assembly of the turret floor, which projects below the main casting into the hull, and on which the tank commander, gunner, and assistant gunner ride. Portions of the floor and sides are open, to permit access to ammunition racks



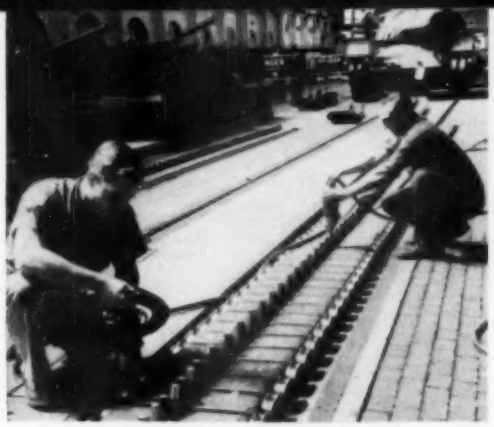
90-MM GUN IS A NEWLY DEVELOPED MODEL, with special muzzle brake, bore evacuator and redesigned breech. Note that it balances when lifted by two lugs on shield. This is one of the final operations in assembling the turret. Gun trunnions are roller-bearinged. Opening on shield to right of gun will carry a 50-cal machine gun which can be aimed and fired just as the gun is by changing turret position or shield elevation electrically. If main power plant is damaged, an auxiliary unit will handle all but tank drive

SCALE AND LEVEL are used to assure final balance of the gun. Weights are added or subtracted to the breech until balance is within 3 lb, to permit precision control and aiming. Scale is tried in this position, then taken above muzzle to test upward balance. This tank incorporates a new panoramic sight and special rangefinder described in *AM* Oct 29 '51, p 95, has numerous other changes to assure high maneuverability and accuracy, plus the stamina, stability, and speed indicated necessary by Korean experience

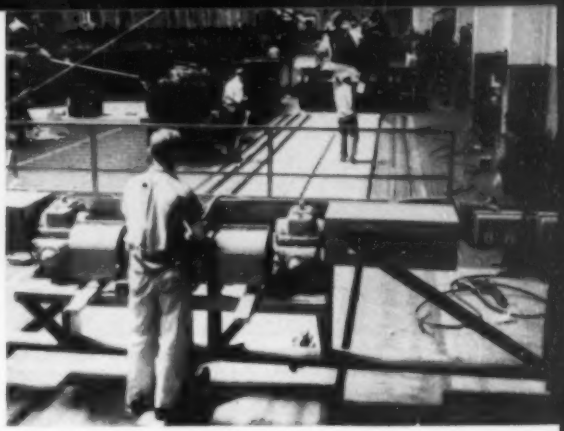


BORE SIGHTING is the final operation before the turret goes in the hull. At top, the brake has been hung on the muzzle with rope to assure balance, while cross-hairs have been taped to the muzzle itself. Below, an expert bore-sights the gun. All fire-control apparatus is installed, including secondary sights (bar-frame on top), and range finder (bulge under "7A" on building column). The turret is now on a precision-levelled stand

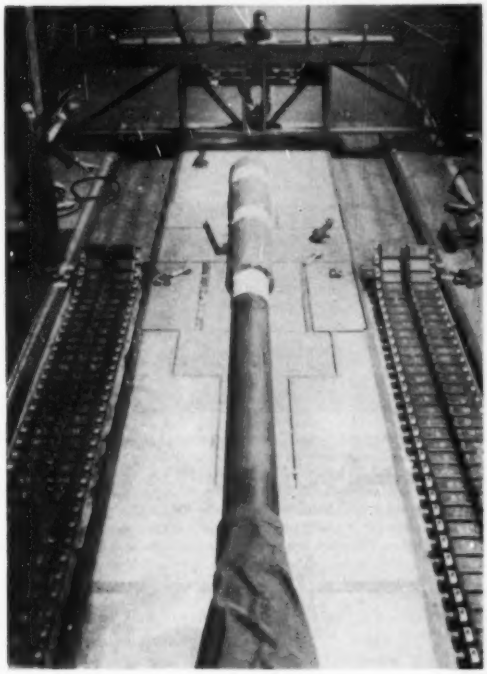
COMPLETED TURRET, removed from its suppporting frame, is lowered into position on the hull. The skeleton floor of the turret can be seen. Separate electro-hydraulic controls make it possible for either the gunner or the tank commander to fire the deadly high-velocity gun. Mufflers and engine exhausts can be seen at either side over the fender, with tail-lights next, a hauling link and the phone-plug box for direct contact with troops at left. The bar for hauling the hull along the assembly line is fastened at bottom center



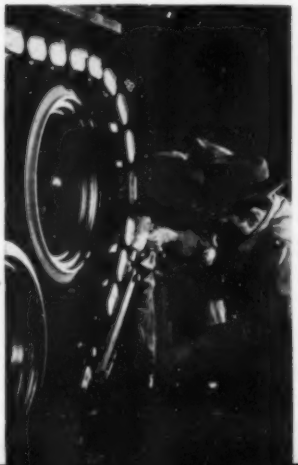
TRACK COMES IN as a sub-assembly, too. The rubber-treaded track, 50 feet long, is rolled into two 25-ft coils and strapped for shipping. The coil is taken to one end of one of the two special floor grooves (left and right) and unrolled into it. Wedge bolts and guide lugs are tightened with air wrenches, so the tank can be hauled over its track. Note pallet loads of track at left and underfloor conveyor between rolled-out tracks



A GATE OR WINCH BRIDGE, designed by Alco for the job, is swung across the end of the line to haul the tank over its tracks. As soon as the tank is over the tracks, the cables now being hauled down will be fastened to the track ends and the underfloor conveyor disconnected. Winches are powered by individual motors through gear reducers, so they can be operated independently if required. The gate rides on rubber-tired casters

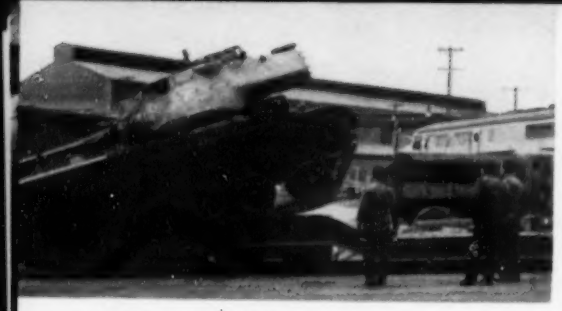


HERE THE WINCHES HAVE BEGUN HAULING. Note the H-beam gate-post set into the floor at right and the center and end gate-support wheels. Tools lie in readiness at the track end, and directly behind the signalling operator is a gasoline pump and oil tank, so the M-47 can be "gassed up." From here on, it runs under its own power—if only to the waiting trailer beyond the gate

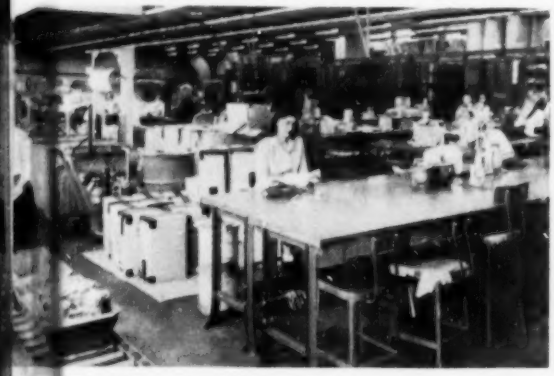


▲ **HERE THE HAUL IS BEING COMPLETED,** the cables pulling the tank along by rolling it up inside its tracks. This places tension on the tracks so the joint can be made against the end. A special air wrench (center and right foreground) does the final pulling in. The end of the lower section of tread is supported by a removable triangle of wedge-pattern flooring, and front ends of fenders are hinged back for clearance

AIR SCREW WRENCH designed by Alco is used in pairs to put final tension on each track so ends can be connected. This is the final assembly operation at Station 23. The service crew gasses (over 250 gal.) and oils the tank, checks it, and starts the engine so it can run off under its own power. Canvas cover shown around gun shield in previous photo is a permanent installation to guard against dust



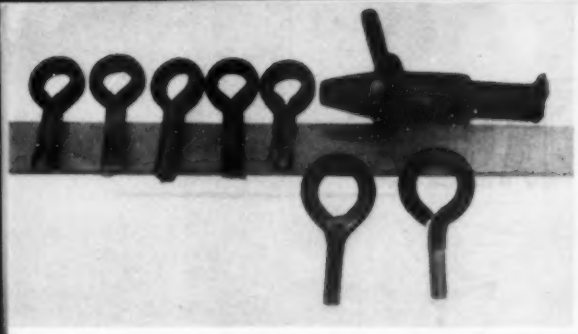
SPECIAL LOW-BED TRAILERS carry completed tanks for the short trip to Alco's test and modification center at the former Niskayuna golf course just outside Schenectady. The tank runs up a landing ramp under its own power. Turret is reversed in traveling position so gun is supported in a gun travel lock on center of rear-deck grilles. In background (beyond the truck) is an Alco-GE diesel-electric locomotive (See *AM* Sept. 3, '51)



SPARE PARTS ALSO PASS along an assembly line, complete with conveyors. Here is the packing room, parts coming in toteboxes at left along the roller conveyor to the washing and preservative tanks at left, then passing over tables for wrapping, labeling and packing in cartons. Overhead conveyor at rear carries cartons downstairs to shipping area on main assembly floor

MODIFICATIONS include both changes in original design and additional ones made on tanks as a result of current tests. Thus "mods" do not affect the main assembly line until convenient. Here is a general view along the modification building. In far background are paint booths, with cleaning areas beyond. Equipment is a small edition of that on the main line. Engineering modifications are made, plus any adjustments indicated during the tank's 45-mile run on the mile-long test track just outside

TESTS ARE QUITE THOROUGH—as the example shows. Tanks are given 45-mile automotive test on track (see title page) before being turned over to Ordnance for final inspection. In combat, driver and gunner pull latch levers which permit seats to drop about 6 in. Hatch covers are then closed, and the "buttoned-up" tank is fought by periscope sights like that framed by protective bars at tank top



EYEBOLTS made from half-round stock (left) were impracticable because of threading difficulties caused by irregular welds. Automatically welded bolts (right) are quickly made, and withstand severe test with tapered drift (above, right)

AUTOMATIC WELDING MACHINE with Lincoln submerged-arc welding head is capable of producing 1500 eyebolts a day with two operators. With manual welding, one operator could not make more than 600, even when working at top speed

AUTOMATIC WELDING MAKES EYEBOLTS FASTER, BETTER

Cost savings up to 30% are achieved by changing over from manual welding to a simple, automatic setup. Resulting product has higher strength and no scrap loss

BY W H VOLKMAR, Manufacturing engineer, J I CASE CO, Rockford, Ill.

HEAVY-DUTY eyebolts are produced in six different sizes and in lots as high as 100,000 a year at the J I Case plant, Rockford, Ill. Hot forming and hand welding did not prove satisfactory, because an experienced welder could not produce more than 600 a day, and failures developed at the weld point. Fabricating from half-round bar, with the two sections forge-welded together to form the shank, did not work out because improper welds made thread cutting difficult.

Finally, it was decided to do the job by forming from round stock and positioning the formed bolts in copper blocks on a revolving table which positions them accurately under the head of an automatic shielded-arc welding unit.

The copper blocks, or dies, are set around the periphery of the table which indexes one station at a time manually, and the weld is completed in three sections, using a 30-V, 600-amp generator setting with reverse polarity. Welding wire is 5/32 in. in dia and a Lincoln LAF-2 welding unit is employed.

The weld is slightly off center as far as position of the descending wire is concerned. Thus, the copper blocks are made alternately right and left, so after a bolt has been welded on one side it is removed from the die, turned over, and placed in an adjoining block to bring the reverse side into proper position for welding. There is no cleaning problem, the bolts are tossed into a hopper by the helper, and by the time they are cool the flux has dropped from the weld.

To save time, it was necessary to set the unit for automatic starting and stopping of the head. Because a plug weld is being made, more flux is required than for a conventional weld. If this were to be handled by automatic timing before welding, too much delay would be involved. So the following cycle was developed: (1) Operator indexes the fixture and closes a foot valve to lock and ground the work; (2) he actuates a start button on the head but does not hold it depressed, causing the wire to feed down until it strikes the work, when the flux supply is tripped; (3) a split second after sufficient flux has been deposited, he pushes the same button again to start the 3-sec welding cycle, shutting off with the usual lengthening of the arc; and (4) foot valve is depressed to unlock the fixture, whereupon the cycle is repeated. A second pushbutton on the head permits stopping the operation in the case some irregularity develops.

After refinements were completed and all difficulties surmounted which usually develop with a new method, the operators developed their skill to a degree wherein the weld was still molten when the fixture was indexed to the next position, causing the metal to spill and allow a crater to develop. This was corrected by cushioning the indexing at the locking point and maintaining the same cycle time.

Strength of the welded joint is tested by driving a large tapered drift pin into the eye until the bolt fails. With the automatically welded bolts, the pin was forced through the eye section until the 1½-in. inner diameter increased ⅜ in. with no failure at the point of weld. This was considered ample to meet any service demands.

ROUND TABLE

Pigs Is Pigs

"I ran into a snag, Ed. That new man who blew in from Kansas City doesn't fall in with the idea of cleaning up. I told him it was customary for the boys to clean up periodically, but he just shrugged his shoulders and went on with what he was doing."

"I don't blame him a bit, Al; he wasn't hired to do that kind of work. He's a machinist, not a janitor."

"Those are the words he used, exactly."

"I'll have to give the guy credit for having some common sense. I've always argued that the shop should be in order all the time—it shouldn't require periodic cleanups."

"But, Ed, we've always taken fifteen minutes at the end of the week to tidy up a bit so that things were ready for a good start on Monday morning. What about your own home? Doesn't your wife bore in every Saturday and give it a thorough going-over?"

"Sure she does, for possible Sunday company. But if I could afford a maid, she wouldn't. She has to do it—there's nobody else. But, even so, it's only a lick and a promise; we don't get the place very messed up. That's my point, too. A good man doesn't get the shop messed up in the first place—he keeps his work area straightened up so the cleanup men only have small dirt to pick up."

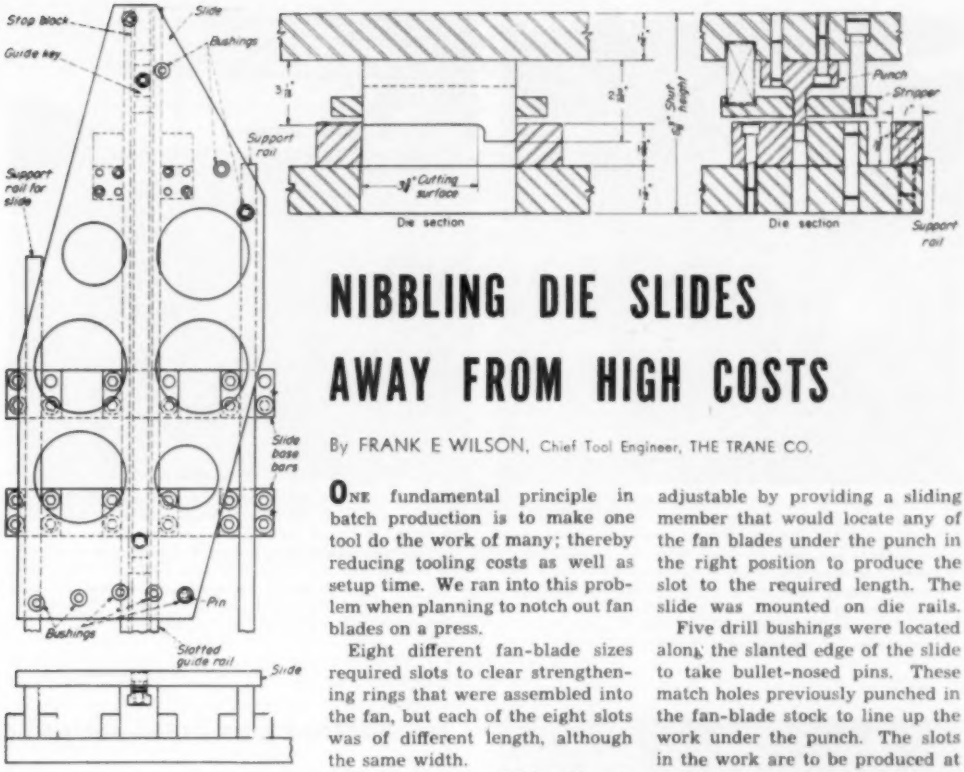
"I don't see why the men shouldn't clean up the dirt as they work, too; otherwise they'll get careless and, naturally, the dirt will pile up. I'd think a good man would want to keep things orderly and clean around him. But the thing that really gets in my hair is to have a man object to doing what all the fellows have been doing for years. Besides, the sweepers don't check machines anyway—they just get rid of chips."

"You ought to thank your lucky stars that you have run into somebody whose ideas may pull you out of the mud. You need a maintenance man, too."

"Out of the mud nothing: he's proposing to leave us in it, like pigs. Or maybe he needs a maid, too. He ought to know that the sweepers can't get around very often, and it's up to him to keep things clean between."

"Get the sweepers there oftener—and let your machinists do machinist work, Al."

IS the individual responsible for his work area, or should it be left to the sweeper? Can a foreman properly insist that a man do other than the work he was hired for? Your ideas and opinions will interest others. Discussions of earlier topics appear on later pages.



NIBBLING DIE SLIDES AWAY FROM HIGH COSTS

By FRANK E WILSON, Chief Tool Engineer, THE TRANE CO.

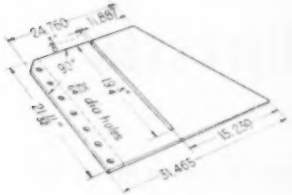
ONE fundamental principle in batch production is to make one tool do the work of many; thereby reducing tooling costs as well as setup time. We ran into this problem when planning to notch out fan blades on a press.

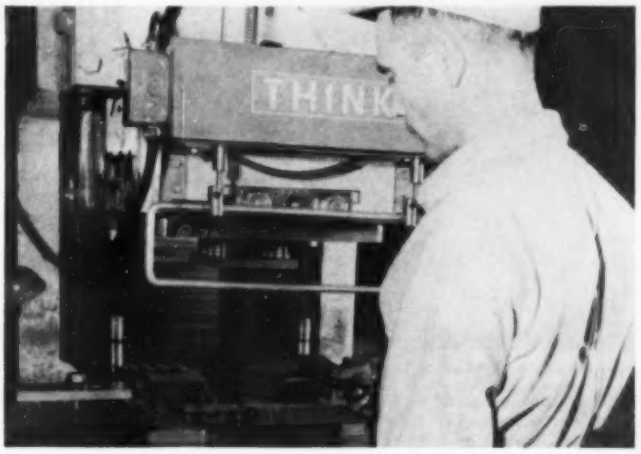
Eight different fan-blade sizes required slots to clear strengthening rings that were assembled into the fan, but each of the eight slots was of different length, although the same width.

The choice of a nibbling die was obvious, because an elongated punch might be adjusted to cut to different depths in the work. Instead of adjusting the punch, however, Trane engineers made the die adjustable by providing a sliding member that would locate any of the fan blades under the punch in the right position to produce the slot to the required length. The slide was mounted on die rails.

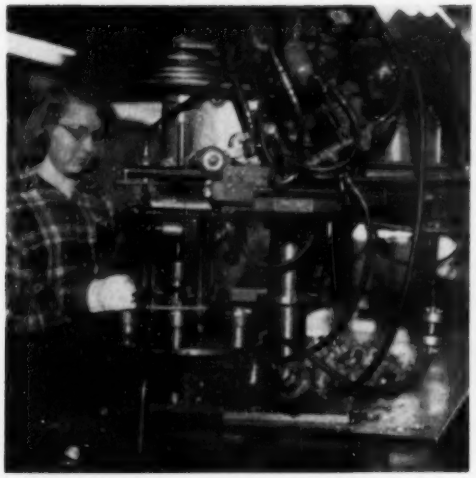
Five drill bushings were located along the slanted edge of the slide to take bullet-nosed pins. These match holes previously punched in the fan-blade stock to line up the work under the punch. The slots in the work are to be produced at a slight angle to the mounting edge of the work, so the bushings are aligned at this angle to the axis of the punch. For each of the eight workpieces, a different combination of pins is used.

DIE SLIDE is supported by two side rails and guided by slotted rail in middle, which mates rail on under side of slide. Large holes in slide reduce weight. Fan blade at this point is punched and blanked, but flat





FAN-BLADE STOCK is located over bullet-nosed pins on die slide. No. 7½ Verson press is equipped with an electrical safety that halts the ram if the operator contacts the rectangular trip bar



ELECTRICAL FITTINGS are counterbored and chamfered at the rate of 1 fitting per sec, using a 14-in. Delta floor-model drillpress with a 1-hp motor and a special base. Extra equipment includes pneumatic automatic feed, pressure reducer, roller trip, and pilot valves. The die-cast fittings are placed in a chute (removed) whence they are fed by gravity down to the Bellows air-operated dial table. A delayed air blast removes chips and cleans the piece. An air cylinder knocks out the completed casting. Cost per piece, including all depreciation but excluding plant overhead is $0.0036.

PUNCHING OUT THE FLASH on die castings for Mae West life preservers is done on the same machine—without taking off the chip blower. Pneumatic indexing and special equipment make the operation automatic except for manual loading. The castings fit over punches with spring-loaded strippers carried on the indexing table. A flat disk chucked in the spindle presses down the work over the punches. The stripper springs the piece off, and it is blown to the right into a carton by the upper jet.

TWO HOLES ARE TAPPED to a 1-in. depth with a spiral-flute tap on an automotive steering-column bracket at a cost of only $0.02 per piece. A double-spindle head is used, with an air-actuated lever fixture to hold the work. Drillpress is a Delta 17-in. Production rate is one bracket every 5 sec.

production jigs boost output when tapping, counterboring, or...

punching out flash on drillpresses

Highly developed production jigs are used at Yoder Die Casting, Dayton, Ohio, to reduce the cost of drillpress work. One operation is completed in 1 sec, another in 1½, and a third at a 5-sec rate

Practical Ideas

Converted Lathe Bores Ball Sockets

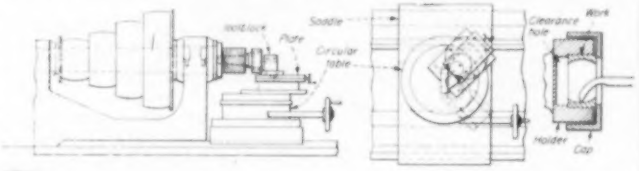
OUR TOOLING for this rush job proves that you can go a long way in borrowing parts and equipment from other machines to build up an old engine lathe for a specialized job. We had to cut partial balls and sockets that formed alignment bearings. The balls were easy to do on a lathe, but the sockets required some tricky tooling.

First, we took a saddle from a milling machine and mounted it on the lathe ways. This acted as a steady base for a circular shop table, which was mounted with its center on the lathe centerline and exactly under the point where the center of the work would be when clamped. A rectangular plate was clamped on the shop table, and a special toolblock was mounted on the plate to hold a long, bent boring tool, ground for this job.

Work was mounted by slipping it inside a snugly fitting holder, then threading on a cap (threads not shown) that clamped against the front end of the work. A wide hole in the cap and a clearance hole behind the work in the holder allowed tool clearance. The hole in the holder, behind the work, also allowed insertion of an extractor to pull out the work when it was finished.

The tip of the boring tool had to be located from the center of the rotary table by the amount of radius required within the work. Adjustments could be easily made by shifting the tool within the toolholder. After the tool was set, a simple rotation of the shop table produced the required finishing cut inside the work.

Relief was milled in one face of each socket to allow assembly of a ball. *C D Mackinnon, Lanarkshire, Scotland.*



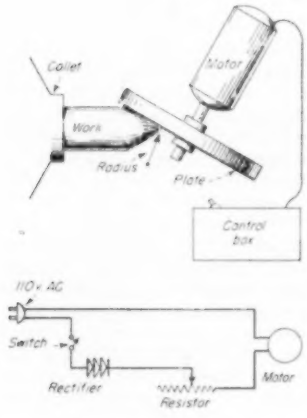
Small DC Motor Runs Lapping Setup

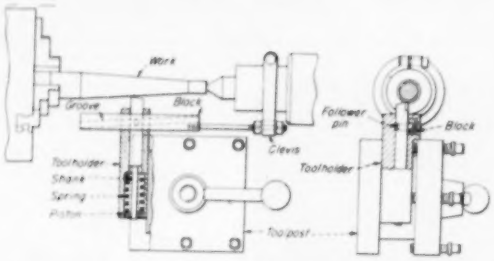
WE WANTED TO LAP the coned points of some special punches that had been previously turned, radiused, and ground. To provide a cheap, light setup on a lathe compound, we started with a surplus 28-volt DC motor.

Our power source was 110-volt AC, so we used a 410-ohm variable resistor, a switch, and a selenium plate rectifier in the circuit. The resistor allowed adjusting the voltage until the motor ran at about the right speed. It also cut down the voltage so the motor was not burned out. The rectifier produced pulsating DC, which operated the motor smoothly. A motor-generator power source would be satisfactory, but less smooth.

The mechanical setup was on the lathe compound, where the motor was mounted at an angle to the lathe centerline. The lapping tool was a CI disk, drilled and reamed to fit the motor shaft, and held by a setscrew. Lapping compound was olive oil and diamond dust.

Our objective was a high polish on the punch, which we got neatly by bringing the slide up so the lapping plate touched the cones of the punches. *George T Miller, New York, NY*





Taper-Turning Tool Tailstock Guided

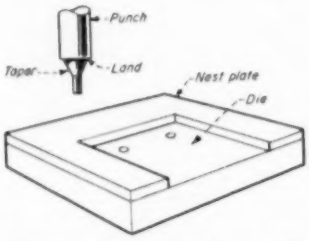
FOR ODD TAPER particularly where it is impossible to set over the tailstock, or where it is not advisable, we utilize a taper attachment as illustrated. The guide bar is clipped to the tailstock spindle with a clamping ring, which carries an anchor rod that supports a diagonally grooved guide-block.

The toolholder is a block clamped to the toolpost, and is made by broaching a drilled hole, or by milling the block, then covering it to confine the tool. The hole for the spring is drilled from the rear of the block, and a shank and piston are attached to the rear of the tool. Thus, spring pressure tends to force the tool back into the block, but this force is countered by the grooved block.

A follower pin is keyed into the tool itself, and this rides in the groove in the block. To prevent the grooved block from swaying or bending, a hole is cut through the toolholder in the direction of the lathe centerline. The block rides in this hole as the holder moves under saddle power to the left.

Requirements for cutting such a job call for a new block for each new taper to be cut. The block must be as long or longer than the work. Quick disassembly of the tool is allowed by the pin inserted through the piston and tool shank. *Clifford T Bower, London, England.*

Tapered Punch Cuts Holes in Belting

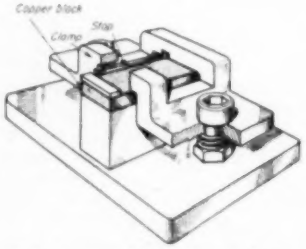


LEATHER BELTS to be used as brakes had to have two holes punched in each end, but we were not getting good results with the usual drilling and counterboring methods. This punch worked out to make the job easier, and produced much better results.

The trick was in the lands on the punch, at the top of the taper. The straight section at the bottom was barely a clearance diameter for the rivet hole drilled in the die. The tapered section spread the leather, and the land cut and compressed the top of each hole in the leather to make room for the flat head of the rivet. *Donald D Amison, Providence, RI.*

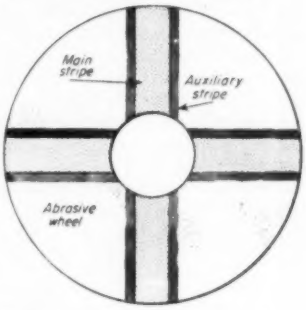
Grinding Thin Stock

FACED with the problem of surface grinding a 0.006-in. step to close tolerance in 0.010-in.-thick type 420 stainless steel (R. 48), we designed a fixture to hold a single piece at a time on a block of pure copper ½ in. thick, as shown. Using a 1⅛ in. x 10 in. 46-G-4 grinding wheel, large flow of dilute soluble oil at high pressure, and a single, hand-fed pass at full depth, the parts were successfully completed. As the major problem with thin metals is heat distortion, use



of the copper block in the fixture increased heat removal, thus made accurate fixturing possible. *R J Dodson, Chicago, Ill.*

Grinding-Wheel Code Is Permanent Identification

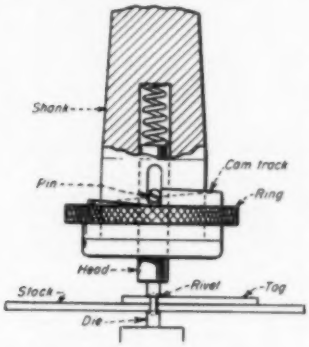


OUR MACHINE SHOP uses a large number of grinding wheels, for both surface and cylindrical work. Manufacturers' markings soon are obliterated, so we have substituted a simple color code. Two stripes of colored lacquer X'ed on each side of each wheel do the job.

We provide a number of code charts on the walls of the shop for quick reference. Three colors are used: red, black, and yellow. The central stripe indicates the main use for the wheel, and side stripes can be added to indicate special properties of the wheel for specific jobs. *H J Gerber, Stillwater, Okla.*

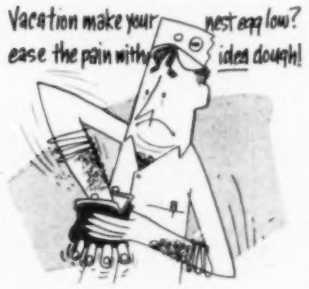
Drillpress Adapter Peens Rivet Heads

SPEEDIER AND EASIER to work than a hammer, this riveting attachment for a drillpress works with spring pressure to hammer the top of the rivet each time the drill spindle rotates. It was developed for riveting a tag plate to a piece of sheet steel.

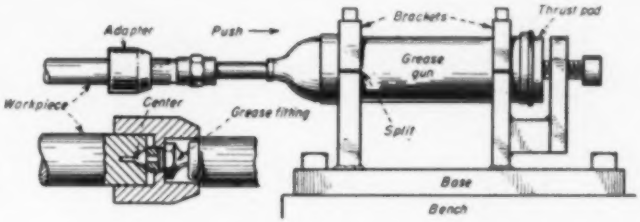


The shank is drilled to take a riveting head, which is assembled with a spring behind it. A cam-track ring with a knurled shoulder is slipped on to the shank, where it is held by a shoulder at the bottom. Then the shank is assembled to the drill spindle.

If the knurled ring is held by hand, and the feed lever of the drill is brought down until the head hits the rivet, the rivet will be given steady, even blows. The end of the head is concave to form the rivet. The drillpress runs at a moderate speed. *Donald Watson, Rochdale, England.*



Send your idea today



Automatic Center Lubricator

PARTS having precision lapped centers were coming from "finish grind" eccentric. The trouble was traced to dirt entering the center holes from the spout of the oil can used to apply lubricant. The following method was devised to give each center a small shot of light grease, meanwhile avoiding contamination. It stopped the eccentricity and speeded handling of the parts.

Principal component of the setup is a standard 4-oz-cap. grease gun such as is applied to a conical fitting upon which it locks when the cap end of the gun is depressed. In this application the process is reversed. The tube end of the gun is depressed into the stationary body by pressure from the workpiece.

Capscrews are used to clamp the grease gun in a welded steel support comprising a base plate and two upright members, bored to hold the gun and body and split for clamping. The unit is bolted to a bench convenient to the grinding machine.

The adapter for centering the workpiece consists of a light alloy sleeve, bored at one end to engage the piece and at the other end to fit the OD of the gun nozzle. The wall between the two recesses is drilled and tapped to receive a standard grease fitting, the back end of which contacts the face of the workpiece. The fitting is permanently locked in the end of the gun tube.

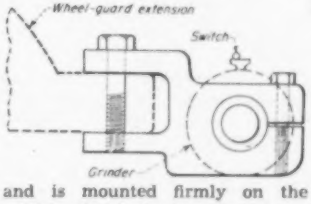
To apply lubricant, or thick white lead, the operator pushes the workpiece into the adapter. This drives a shot of lubricant into the centerhole. *Clifford T Bower, London, England.*

Hand Grinder Attaches to Surface Grinder

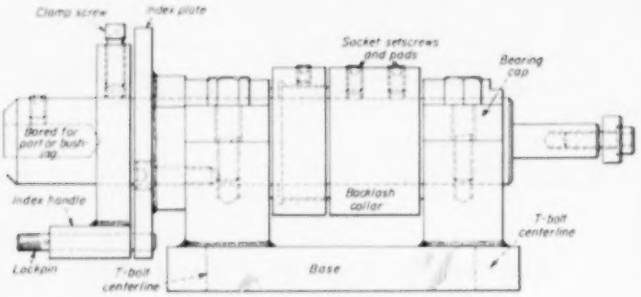
WHEN WE HAVE TO GRIND surfaces on punch plates and punches that are impossible to reach with a normal surface grinder, we add this attachment to the surface-grinder wheel guard. We still retain all the table feeds available.

The bracket that holds the grinder has a yoke that is bolted to the wheel guard. The grinder is held by a split collar, which is offset below the yoke to allow working on a die without interference from the regular surface wheel.

If the wheel guard is sturdy



and is mounted firmly on the machine head, the hand grinder is quite accurate. If the guard has no extension as illustrated, you can weld a block into position to take the yoke of the attachment. *W Theodore Whitman, New York, N Y*



Simple, Rugged Index Plate Does Universal Holding Jobs

TO GET THE MOST out of a dividing head of 2, 3, 4, and 6 divisions, including accuracy under heavy cuts and economy of manufacture, we made one based on pure fundamentals—with no frills at all.

The first problem was how to arrange for holding work. Collets are costly and not always practical, and chucks can easily get out of alignment. Therefore, we started with a 2½-in. mild-steel shaft (easily replaceable), making a hole at one end to take the OD of the work, and necking the other end to take an ID. In practice, we have several of these central shafts, each machined at both ends to take specific jobs.

To support the shaft, a heavy baseplate is fitted with bearing blocks split horizontally. The blocks are low to keep the shaft as close to the base as possible, allowing maximum support and strength.

Between the bearings is a collar assembly made to take up backlash. One is threaded, and the other is tapped like a cap. When the collars are assembled and tightened (not so tight) they prevent rotation), a screw through the cap wall is tightened on a brass pad that holds in the thread of the larger collar, clamping the two collars together. Setscrews through the wall of the large collar are tightened to grip pads on the central shaft, which makes the collars rotate with the shaft.

The index plate is assembled next with only two capscrews. This may be completely drilled to provide a maximum number of spaced holes for indexing. The shaft itself is fitted with a dog that contains a bushing and pin that fits the indexing holes of the plate. A screw working through one edge of the dog presses a pad against the shaft, which permits clamping the dog to the shaft. Thus, the shaft is rotated with the dog, and the pin is pushed forward into any of the holes to hold the work at that position.

Slots are cut in the base to take T-bolts that assemble the head to a machine table. We have to remove the dog to assemble these bolts, but that is simple, which is one of the advantages of this design.

The whole rig, which can just be lifted by one man, has ample stock and is rugged. In fact, we often cut into the bearing block with a milling cutter when we get too close, but this doesn't harm anything much. Changing the central shaft for a new setup is easy and fast, and any number of special workholders can be attached to either end of a shaft for special jobs, much more simply than setting up a dividing head. *N Palmer, Paddington, Australia.*

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PRACTICAL IDEA

in

June 9, '52 Issue

is

Hjalmar Dahl

Rotating Punch Bends Rings

An extra payment of $25 is made for the best Practical idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

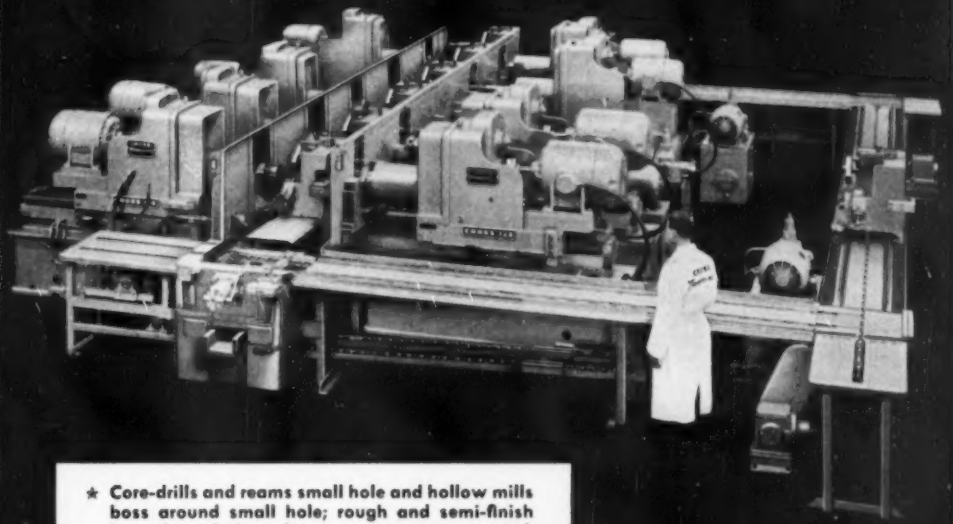
REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worrry about your shortcomings as a draftsman, photographer or author —every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

Bores, Hollow Mills and Trepans Tank Idler Arms

Another Transfer-matic by Cross



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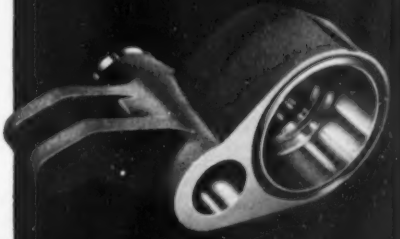

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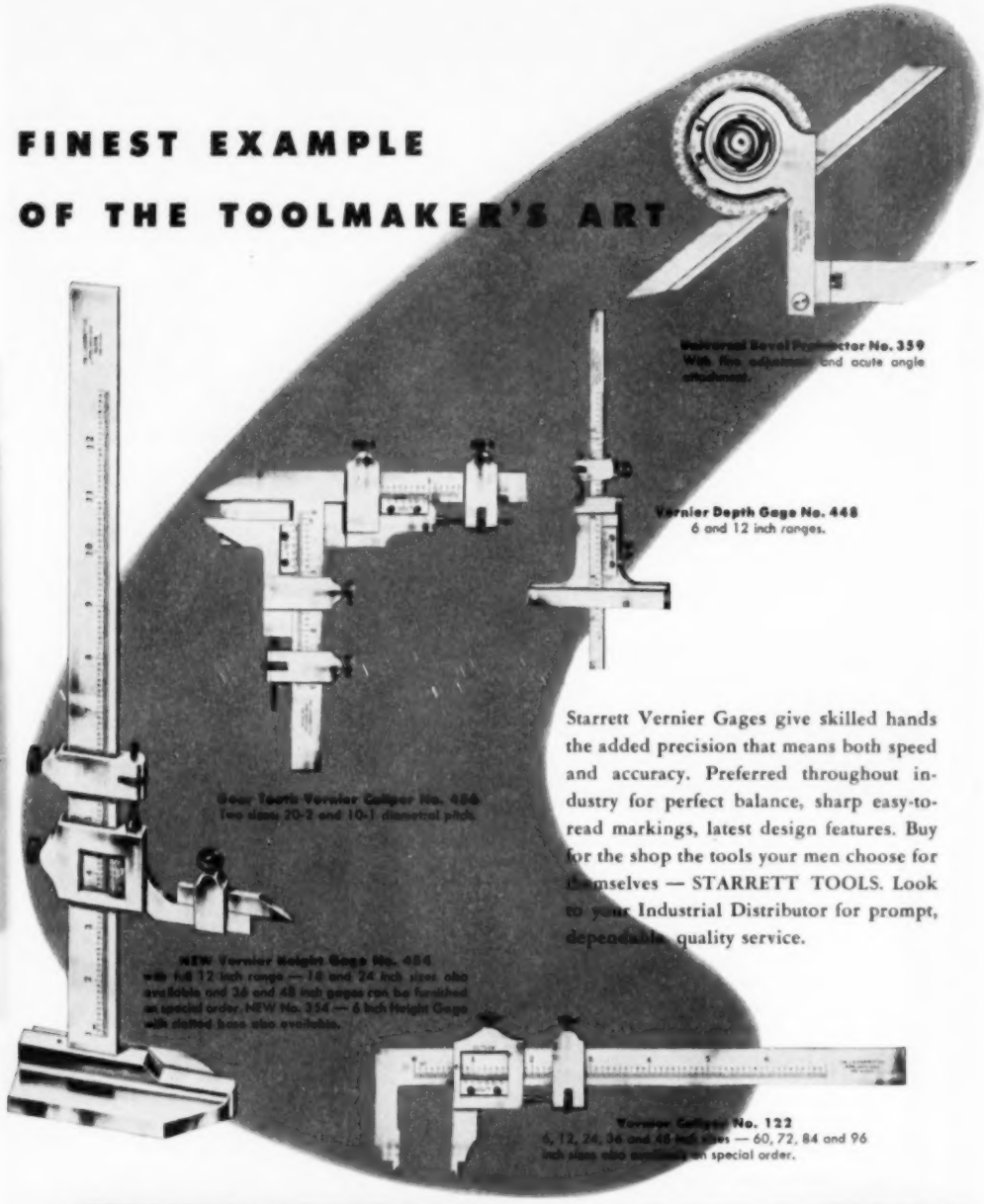

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General-Purpose Acme Screw Threads...I

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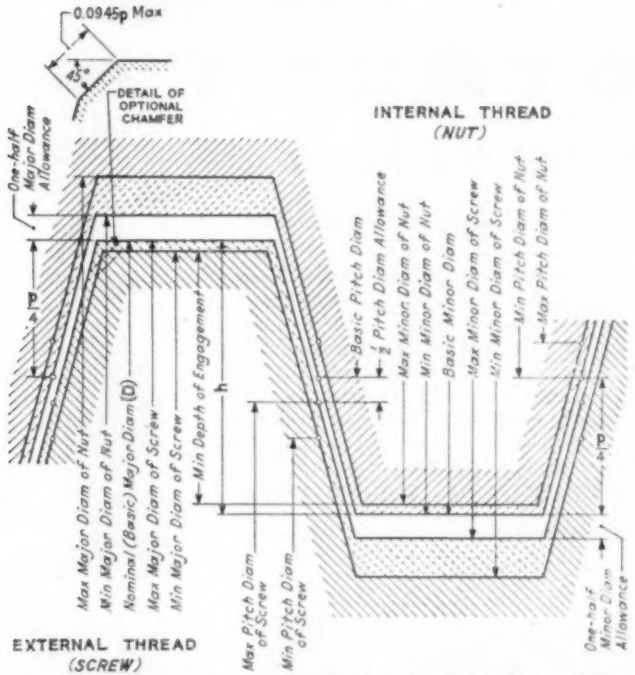


Disposition of Allowances, Tolerances, and Crest Clearances for General Purpose Acme Threads (All Classes)

Symbols:
p = pitch
h = basic thread height

When formulated, prior to 1895, Acme screw threads were intended to replace square threads and a variety of threads of other forms used chiefly for the purpose of producing traversing motions on machines, tools, etc. Acme screw threads are now extensively used for a variety of purposes.

The three classes of general-purpose threads have clearances on all diameters for free movement and may be used in assemblies with the internal thread rigidly fixed and movement of the external thread in a direction perpendicular to its axis limited by its bearing or bearings.

In addition to limiting dimensions for the standard series of diameters and pitches of Acme threads, tables of pitch diameter tolerances in the complete standard provide for a wide choice of diameters for a given standard pitch, and by use of the formulas for diameter and pitch increments the pitch diameter tolerances for special diameters and pitches can be determined for each class. Formulas and data are also provided for allowances on external threads and major and minor diameter allowances and tolerances.

Multiple threads should be considered when fast relative motion is required.

Tables on succeeding pages give the limiting dimensions of selected diameters and associated pitches, which are recommended as preferred. These diameters and pitches have been selected to meet present needs with the fewest number of items, in order to reduce the inventory of both tools and gages.

Specifications for General-Purpose Acme Threads

Angle of Thread. The angle between the sides of the thread measured in an axial plane shall be 29°. The line bisecting this 29° angle shall be perpendicular to the axis of the screw thread.

Pitch of Thread. The pitch of a thread is the distance, measured parallel to its axis, between corresponding points on adjacent thread forms.

Height of Thread. The basic height of the thread shall be equal to one half of the pitch.

Thickness of Thread. The basic thickness of the thread at a diameter smaller by one half the pitch than the basic major diameter shall be equal to one half of the pitch.

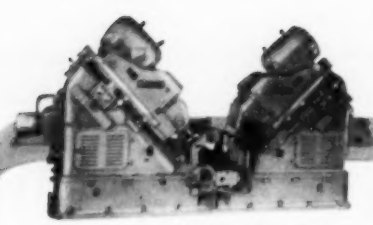
Allowances (Minimum Clearance) at Major and Minor Diameters. A minimum diametral clearance is provided at the minor diameter of all external threads by establishing the maximum minor diameter 0.020 in. below the basic minor diameter on threads 10-pitch and coarser, and 0.010 in. for finer pitches.

A minimum diametrical clearance at the major diameter is obtained by establishing the minimum major diameter of the internal thread 0.020 in. above the basic major diameter for 10-pitch and coarser, and 0.010 in. for finer pitches.

Classes of Thread. The three classes of thread are 2G, 3G and 4G. Each user is free to select the classes best suited to his needs. It is suggested that external and internal threads of the same class be used together for general-purpose assemblies. Class 2G is the preferable choice. If less backlash or end play is desired, classes 3G and 4G are provided. External threads of any class may be assembled with internal threads of any class to provide other degrees of backlash or end play.

Basic Diameters. Maximum major diameter of the external thread is basic and is the nominal major diameter for all classes. The minimum pitch diameter of the internal thread is basic and is equal to the basic major diameter minus the basic height of thread, h. The basic minor diameter is the minimum minor diameter of the internal thread. It is equal to the basic major diameter minus twice the basic thread height, $2h$.

Tolerances. The tolerances on the diameters of the internal threads are plus, being applied from the minimum sizes to above the minimum sizes. The tolerances on the diameters of the external threads are minus, being applied from the maximum sizes to below the maximum sizes.



Two-Way Hydraulic Feed Vee Type Stub Boring Machine

Single Slide and Broaching Machine 5, 10, 15 and 25 Ton capacity

Duplex Surface Broaching Machine 5, 10, 15 and 25 ton capacity

FOOTBURT

line of production machines

engineered for production

1, 2, 3, 4 and 6 Spindle Sensitive Drilling Machines

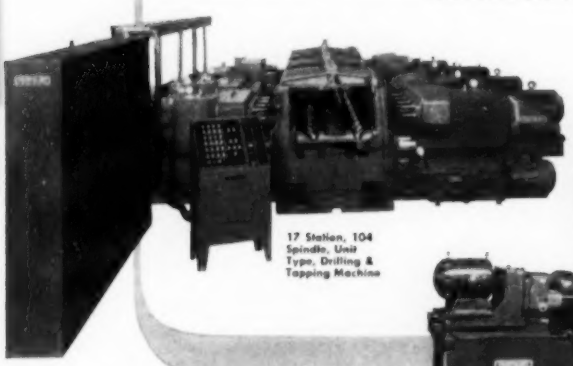
● Way Type Drilling, Boring, Reaming, Tapping and Milling Machines with One, Two or More Ways . . . Station Type Machines . . . Center Column Type Machines . . . Cylinder Boring Machines . . . Inverted Drilling Machines . . . Surface Broaching Machines . . . Sensitive Drilling Machines . . . Hammond Radial Drilling Machines . . . Manufacturing Type High Duty Drilling Machines . . . Independent Feed Drilling Machines . . . Special Machines.

Continuous Type Broaching Machine Built in Four Sizes

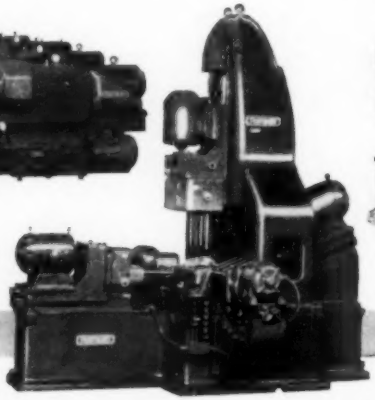
Stub Type Cylinder Boring Machines

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

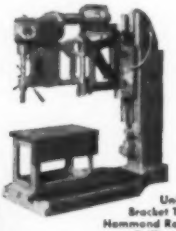
Detroit Office: General Motors Building



17 Station, 104 Spindle, Unit Type, Drilling & Tapping Machine



Five Way 21 Spindle Lead Screw Tapping Machine



Unique Bracket Type Hammond Radial Drilling and Tapping Machine

FOOTBURT

production machine tools—

General-Purpose Acme Screw Threads...II

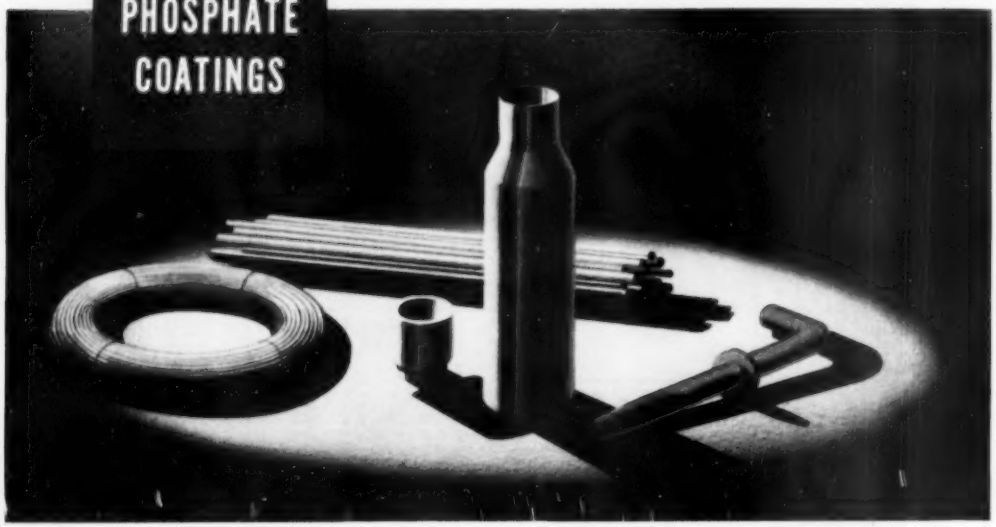
Limiting Dimensions and Tolerances, General Purpose Acme Screw Threads, Classes 2G, 3G, and 4G

Limiting Diameters and Tolerances		Nominal Diameter (D)											
		¼	5/16	⅜	7/16	½	5/8	¾	⅞	1	1 ⅛	1 ¼	1 ⅜
		Threads per Inch*											
		16	14	12	12	10	8	6	6	5	5	5	4
EXTERNAL THREADS													
Classes 2G, 3G, and 4G, Major Diam	Max (D)	0.2500	0.3125	0.3750	0.4375	0.5000	0.6250	0.7500	0.8750	1.0000	1.1250	1.2500	1.3750
	Min	0.2450	0.3075	0.3700	0.4325	0.4950	0.6188	0.7417	0.8667	0.9900	1.1150	1.2400	1.3625
	Tol	0.0050	0.0050	0.0050	0.0050	0.0050	0.0062	0.0083	0.0083	0.0100	0.0100	0.0100	0.0125
Classes, 2G, 3G, and 4G, Minor Diam	Max	0.1775	0.2311	0.2817	0.3442	0.3800	0.4800	0.5633	0.6883	0.7800	0.9050	1.0300	1.1050
Class 2G, Minor Diameter	Min	0.1618	0.2140	0.2632	0.3253	0.3594	0.4570	0.5371	0.6615	0.7509	0.8753	0.9998	1.0719
Class 3G, Minor Diameter	Min	0.1702	0.2231	0.2730	0.3354	0.3704	0.4693	0.5511	0.6758	0.7664	0.8912	1.0159	1.0896
Class 4G, Minor Diameter	Min	0.1722	0.2254	0.2755	0.3379	0.3731	0.4723	0.5546	0.6794	0.7703	0.8951	1.0199	1.0940
Class 2G, Pitch Diameter	Max	0.2148	0.2728	0.3284	0.3909	0.4443	0.5562	0.6598	0.7842	0.8920	1.0165	1.1411	1.2406
	Min	0.2043	0.2614	0.3161	0.3783	0.4306	0.5408	0.6424	0.7663	0.8726	0.9967	1.1210	1.2186
	Tol	0.0105	0.0114	0.0123	0.0126	0.0137	0.0154	0.0174	0.0179	0.0194	0.0198	0.0201	0.0220
Class 3G, Pitch Diameter	Max	0.2158	0.2738	0.3296	0.3921	0.4458	0.5578	0.6615	0.7861	0.8940	1.0186	1.1433	1.2430
	Min	0.2109	0.2685	0.3238	0.3862	0.4394	0.5506	0.6534	0.7778	0.8849	1.0094	1.1339	1.2327
	Tol	0.0049	0.0053	0.0058	0.0059	0.0064	0.0072	0.0081	0.0083	0.0091	0.0092	0.0094	0.0103
Class 4G, Pitch Diameter	Max	0.2168	0.2748	0.3309	0.3934	0.4472	0.5593	0.6632	0.7880	0.8960	1.0208	1.1455	1.2453
	Min	0.2133	0.2710	0.3268	0.3892	0.4426	0.5542	0.6574	0.7820	0.8895	1.0142	1.1388	1.2380
	Tol	0.0035	0.0038	0.0041	0.0042	0.0046	0.0051	0.0058	0.0060	0.0065	0.0066	0.0067	0.0073
INTERNAL THREADS													
Classes 2G, 3G, and 4G, Major Diam	Min	0.2600	0.3225	0.3850	0.4475	0.5200	0.6450	0.7700	0.8950	1.0200	1.1450	1.2700	1.3950
	Max	0.2700	0.3325	0.3950	0.4575	0.5400	0.6650	0.7900	0.9150	1.0400	1.1650	1.2900	1.4150
Classes 2G, 3G, and 4G, Minor Diam	Min	0.1875	0.2411	0.2917	0.3542	0.4000	0.5000	0.5833	0.7083	0.8000	0.9250	1.0500	1.1250
	Max	0.1925	0.2461	0.2967	0.3592	0.4050	0.5062	0.5916	0.7166	0.8100	0.9350	1.0600	1.1375
	Tol	0.0050	0.0050	0.0050	0.0050	0.0050	0.0062	0.0083	0.0083	0.0100	0.0100	0.0100	0.0125
Class 2G, Pitch Diameter	Min	0.2188	0.2768	0.3333	0.3958	0.4500	0.5625	0.6667	0.7917	0.9000	1.0250	1.1500	1.2500
	Max	0.2293	0.2882	0.3456	0.4084	0.4637	0.5779	0.6841	0.8096	0.9194	1.0448	1.1701	1.2720
	Tol	0.0105	0.0114	0.0123	0.0126	0.0137	0.0154	0.0174	0.0179	0.0194	0.0198	0.0201	0.0220
Class 3G, Pitch Diameter	Min	0.2188	0.2768	0.3333	0.3958	0.4500	0.5625	0.6667	0.7917	0.9000	1.0250	1.1500	1.2500
	Max	0.2237	0.2821	0.3391	0.4017	0.4564	0.5697	0.6748	0.8000	0.9091	1.0342	1.1594	1.2603
	Tol	0.0049	0.0053	0.0058	0.0059	0.0064	0.0072	0.0081	0.0083	0.0091	0.0092	0.0094	0.0103
Class 4G, Pitch Diameter	Min	0.2188	0.2768	0.3333	0.3958	0.4500	0.5625	0.6667	0.7917	0.9000	1.0250	1.1500	1.2500
	Max	0.2223	0.2806	0.3374	0.4000	0.4546	0.5676	0.6725	0.7977	0.9065	1.0316	1.1567	1.2573
	Tol	0.0035	0.0038	0.0041	0.0042	0.0046	0.0051	0.0058	0.0060	0.0065	0.0066	0.0067	0.0073

* All other dimensions are given in inches. The selection of threads per inch is arbitrary and is intended for the purpose of establishing a standard.

Cold Form Steel
with amazing new ease!

DETREX
PHOSPHATE
COATINGS



EXTRUDITE PROCESS
interlocks lubricant with work surface!

The Extrudite Process opens the door to faster, less-wasteful cold forming of steel and other metals. This Detrex development chemically interlocks a dry, heat-resistant lubricant to the work surface . . . metal-to-metal friction is prevented even during the most severe working conditions.

Savings are tremendous on operations such as wire and tube drawing, deep drawing, cold heading and room temperature extrusions. To name but a few of the benefits; operations are speeded up on present equipment, tooling lasts longer, parts are produced with less scrap and many process anneals and chemical treatments are eliminated.

The Extrudite Process consists of a special phosphate coating which becomes integral with the work surface. Then a compatible lubricant is applied which drys to a tough, crystalline lubricating film. Thus the treated metal is clean and easy to handle.

If you are now performing or considering cold forming operations, the Extrudite Process should be investigated. **Detrex Corporation, Box 501, Detroit 32, Michigan.**

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Details of the Extrudite Process and its advantages are contained in this informative bulletin. Send for yours today, there is no obligation.

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ALKALIES AND EMULSIONS • WASHERS • DEGREASERS
METAL COLD FORMING PROCESSES • DEGREASING SOLVENTS
RUST PROOFING PROCESSES • DRYCLEANING EQUIPMENT

Limiting Dimensions and Tolerances, General Purpose Acme Screw Threads, Classes 2G, 3G, and 4G (Ctd.)

Limiting Diameters and Tolerance		Nominal Diameter (D)										
		1 ½	1 ¾	2	2 ¼	2 ½	2 ¾	3	3 ½	4	4 ½	5
		Threads per Inch*										
		4	4	4	3	3	3	2	2	2	2	2
EXTERNAL THREADS												
Classes 2G, 3G, and 4G, Major Diam	Max (D)	1.5000	1.7500	2.0000	2.2500	2.5000	2.7500	3.0000	3.5000	4.0000	4.5000	5.0000
	Min	1.4875	1.7375	1.9875	2.2333	2.4833	2.7333	2.9750	3.4750	3.9750	4.4750	4.9750
	Tol	0.0125	0.0125	0.0125	0.0167	0.0167	0.0167	0.0250	0.0250	0.0250	0.0250	0.0250
Classes 2G, 3G, and 4G, Minor Diam	Max	1.2300	1.4800	1.7300	1.8967	2.1467	2.3967	2.4800	2.9800	3.4800	3.9800	4.4800
Class 2G, Minor Diameter	Min	1.1965	1.4456	1.6948	1.8572	2.1065	2.3558	2.4326	2.9314	3.4302	3.9291	4.4281
Class 3G, Minor Diameter	Min	1.2144	1.4640	1.7136	1.8783	2.1279	2.3776	2.4579	2.9574	3.4568	3.9563	4.4558
Class 4G, Minor Diameter	Min	1.2188	1.4685	1.7183	1.8835	2.1333	2.3831	2.4642	2.9638	3.4634	3.9631	4.4627
Class 2G, Pitch Diameter	Max	1.3652	1.6145	1.8637	2.0713	2.3207	2.5700	2.7360	3.2350	3.7340	4.2330	4.7319
	Min	1.3429	1.5916	1.8402	2.0450	2.2939	2.5427	2.7044	3.2026	3.7008	4.1991	4.6973
	Tol	0.0223	0.0229	0.0235	0.0263	0.0268	0.0273	0.0316	0.0324	0.0332	0.0339	0.0346
Class 3G, Pitch Diameter	Max	1.3677	1.6171	1.8665	2.0743	2.3238	2.5734	2.7395	3.2388	3.7380	4.2373	4.7364
	Min	1.3573	1.6064	1.8555	2.0620	2.3113	2.5607	2.7248	3.2237	3.7225	4.2215	4.7202
	Tol	0.0104	0.0107	0.0110	0.0123	0.0125	0.0127	0.0147	0.0151	0.0155	0.0158	0.0162
Class 4G, Pitch Diameter	Max	1.3701	1.6198	1.8693	2.0773	2.3270	2.5767	2.7430	3.2425	3.7420	4.2415	4.7409
	Min	1.3627	1.6122	1.8615	2.0685	2.3181	2.5676	2.7325	3.2317	3.7309	4.2302	4.7294
	Tol	0.0074	0.0076	0.0078	0.0088	0.0089	0.0091	0.0105	0.0108	0.0111	0.0113	0.0115
INTERNAL THREADS												
Classes 2G, 3G, and 4G, Major Diam	Min	1.5200	1.7700	2.0200	2.2700	2.5200	2.7700	3.0200	3.5200	4.0200	4.5200	5.0200
	Max	1.5400	1.7900	2.0400	2.2900	2.5400	2.7900	3.0400	3.5400	4.0400	4.5400	5.0400
Classes 2G, 3G, and 4G, Minor Diam	Min	1.2500	1.5000	1.7500	1.9167	2.1667	2.4167	2.5000	3.0000	3.5000	4.0000	4.5000
	Max	1.2625	1.5125	1.7625	1.9334	2.1834	2.4334	2.5250	3.0250	3.5250	4.0250	4.5250
	Tol	0.0125	0.0125	0.0125	0.0167	0.0167	0.0167	0.0250	0.0250	0.0250	0.0250	0.0250
Class 2G, Pitch Diameter	Min	1.3750	1.6250	1.8750	2.0833	2.3333	2.5833	2.7500	3.2500	3.7500	4.2500	4.7500
	Max	1.3973	1.6479	1.8985	2.1096	2.3601	2.6106	2.7816	3.2824	3.7832	4.2839	4.7846
	Tol	0.0223	0.0229	0.0235	0.0263	0.0268	0.0273	0.0316	0.0324	0.0332	0.0339	0.0346
Class 3G, Pitch Diameter	Min	1.3750	1.6250	1.8750	2.0833	2.3333	2.5833	2.7500	3.2500	3.7500	4.2500	4.7500
	Max	1.3854	1.6357	1.8860	2.0956	2.3458	2.5960	2.7647	3.2651	3.7655	4.2658	4.7662
	Tol	0.0104	0.0107	0.0110	0.0123	0.0125	0.0127	0.0147	0.0151	0.0155	0.0158	0.0162
Class 4G, Pitch Diameter	Min	1.3750	1.6250	1.8750	2.0833	2.3333	2.5833	2.7500	3.2500	3.7500	4.2500	4.7500
	Max	1.3824	1.6326	1.8828	2.0921	2.3422	2.5924	2.7605	3.2608	3.7611	4.2613	4.7615
	Tol	0.0074	0.0076	0.0078	0.0088	0.0089	0.0091	0.0105	0.0108	0.0111	0.0113	0.0115

* All other dimensions are given in inches. The selection of threads per inch is arbitrary and is intended for the purpose of establishing a standard.

Here's a new *Free-Machining* ARMCO STAINLESS STEEL

Here is a part forged from 3-inch round Armco TS 347F before and after machining. Good forging and machining qualities are combined in this highly heat- and corrosion-resistant grade

Type TS 347F is a new Armco free-machining stainless steel. It was developed to meet the demand for improved machinability in the stabilized Type TS 347, used in jet engine parts subjected to high temperatures.

You may not be building jet engine parts. Yet it is good to know that this free-machining grade, fortified against intergranular corrosion by a columbium-tantalum addition, is now available for applications authorized by NPA.

OTHER FREE-MACHINING TYPES

Besides TS 347F, Armco produces the free-machining types: 303, 416, 420F, 430F and 440F. These grades contain closely controlled amounts of sulfur, phosphorus or selenium. They are used where longer tool life and faster metal-removal are essential. The free-machining grades are indispensable in screw machine work where there are critical drilling and forming operations.

ASK US FOR INFORMATION

Each of the Armco free-machining stainless steels has its field of preferred applications. We will be glad to give our recommendations on the best type for your requirements. If you need general information on speeds, feeds, tool types and the rest, write for a copy of the booklet, "Machining of Armco Stainless Steels."

ARMCO STEEL CORPORATION

4132 Curtis Street, Middletown, Ohio
Plants and sales offices from coast to coast
Export: The Armco International Corporation

ARMCO

TALKING SHOP

Capsule Apprenticeship

ONE New England machine-tool builder, required to hire a number of men, has set up a break-in department, staffed with several skilled mechanics and equipped with basic machine tools. There green men spend a couple of days, becoming familiar with millers, surface grinders, and tools, as well as with company customs, location of locker rooms and the like, before they begin production work. This reduces the strangeness less abruptly, eases the training job of the foreman. It also permits the weeding out of men with mechanical or psychological inaptitude.

Rush Job

I am a *RUSH* JOB.
I belong to no age, for men have always hurried.
I prod all human endeavor.
Men believe me necessary—but falsely.
I rush today because I was not planned yesterday.
I demand excessive energy and concentration.
I over-ride obstacles, but at great expense.
I illustrate the old saying, "haste makes waste."
My path is strewn with the evils of overtime, mistakes and disappointments.
Accuracy and quality give way to speed.
Ruthlessly I rush on.
I am a *RUSH* JOB!

—*Anonymous*

HBDM

WE'VE LONG LOOKED with regret at the industry's longest name: horizontal boring, drilling, and milling machine. It is difficult to say, hard to get in a headline. Maybe some thoughtful soul will offer a compact name, like boremill, or drillmill, or give it an initialed name, like a Washington agency. Editors, for one group, would greet the move with open arms.

Fracture

A BREAK in a metal part is trouble—and undesirable, to say the least—except in two cases. Both exceptions are intentional breaks. The first is the piece broken so the fracture can be studied; the second the bearing which must be split for assembly. In the latter case, the bearing is notched across a diameter and broken, then reassembled around the shaft. The fracture insures perfect realignment and a good seal.

What Is It?

ONE OF THE PROBLEMS with a new product or process is what to call it. Sometimes the solution is to expand the definition of an old word, sometimes to dream up a new one. When Babcock & Wilcox built equipment to pierce and draw hollow steel forgings (*AM*—Aug. 4 '52, p146) they had two major pieces of equipment. One was easy. It was a vertical hydraulic press so they called it a vertical hydraulic press. But the other was a hybrid not quite like anything built in America before. It was a little like a draw bench, a little like an extrusion press with the chamber left off, and a little like a deep-drawing press that got tired and lay down. The press release called it a draw bench. But when one of our editors went out to look at it he wasn't happy with the name. Turned out some of the B&W engineers weren't happy with it either. So while hot steel groaned through the dies, they caucused on the floor and came up with a hybrid name for a hybrid machine—push bench—which is the name they now are using and is the name we used in our story.

Birth of an Idea

THE PUSH BENCH is the outgrowth of an idea that G J Hartnett, Jr, superintendent of B&W's Barberton Works, got back in 1948. He was talking with engineers from Chesterfield Tube Co in England, found they were producing large seamless tubes from billets by the pierce-and-draw method. Earlier he had visited Germany and studied the developments that had been made there during the war in the extrusion of steel.

Back at the Barberton Works he began to fit the two ideas together and concluded it would be possible to use the Chesterfield method in larger sizes, working from ingots rather than billets. Hitch was that the large press required to pierce the ingots would be idle perhaps 80% of the time while the push bench was forging the pierced ingots to size through several reheats. The idea stayed on the shelf until, a year later, the economics of making even larger drums from heavy plates instead of short welded sections were proposed. The two ideas fitted together into a two-table press that can form 50-ton plates (if anybody ever rolls them) when it isn't piercing 13-ton ingots. Thus the push bench was added to the growing list of new techniques for the hot shaping of steel.

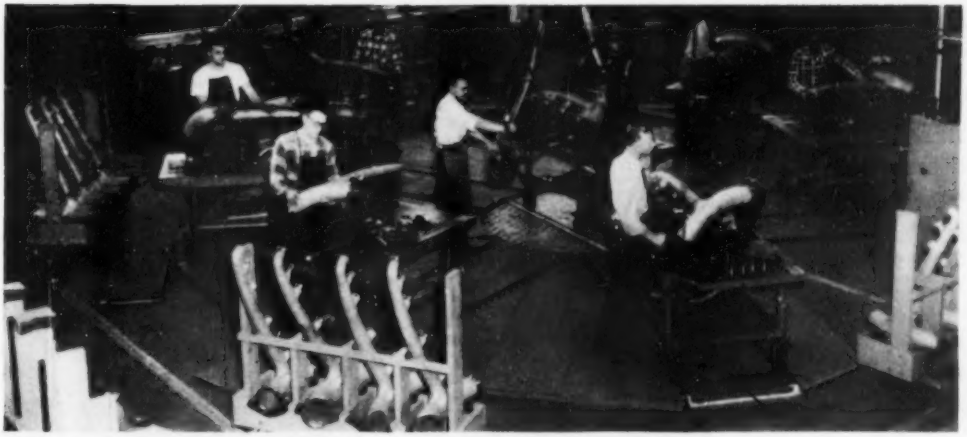
Deus ex Machina

OUR SWELTERING SUMMER DAYS as an electric craneman are recalled by the new catalog of Dravo Corp, showing a full line of cab air conditioners. The modern craneman has his health safeguarded by removal of dust, dirt, fumes, odor, plus the opportunity to be cool in summer, warm in winter. But he misses the fun of hanging out of the cab to cuss at the hooker, or of sliding the windows shut on a cold winter day and taking a snooze, warmed by the heat of the resistances in the panel behind him. What's more, he becomes still more remote and unapproachable, although the conditioned air is supposed to keep him more alert. He is now truly the god of the machine, cussable only by walkie-talkie.

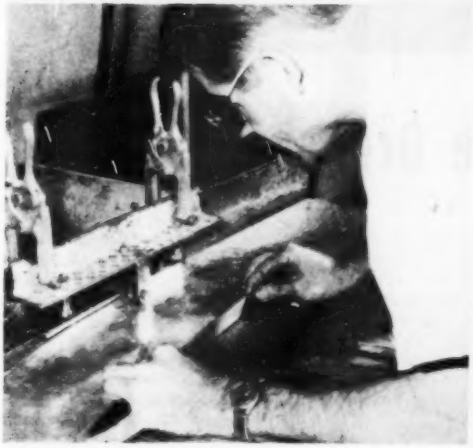
EXHAUST MANIFOLDS FOR CONTINENTAL TANK ENGINES are welded, sandblasted, sized, and inspected along straight-line conveyor; unique in manifold-production shops. Setup problems included locating machines and equipment, timing flow, and feeding parts. ***Ryan Aeronautical Co***

SHOP SHOTS

TOTE BOXES DOUBLE AS STOCK BINS at punch press where angle-iron brackets are located to hold them. Racks on floor stand tilt the boxes at 5°, those welded to press structure tilt at 35°. ***Westinghouse Electric Corp***

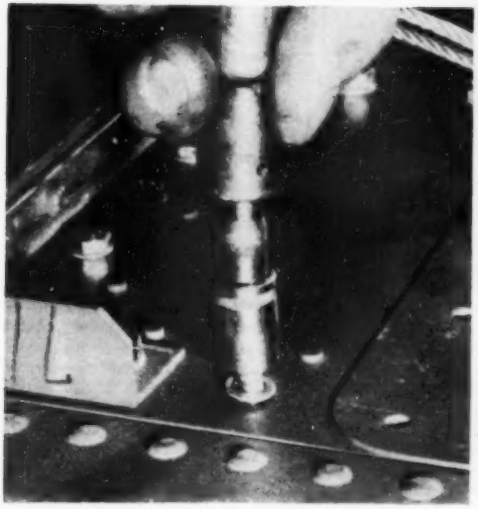


EXHAUST SYSTEMS FOR PRATT & WHITNEY AIRCRAFT ENGINES are assembled on seven mobile jig tables, then rolled to central turntable where flanges are spotwelded by overhead twin gun. Circular track around area locates racks of components for assemblers at the seven stations. ***Ryan Aeronautical Co***



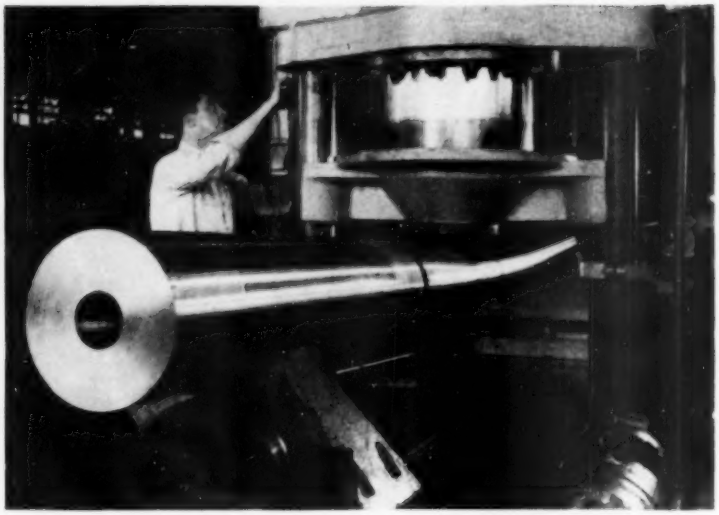
THREE FIBER ROLLERS ON AN ANGLE IRON guide large contour frames for trimming operation on a Yates American shaper. One man does work faster than two did before, when it was necessary to bolt the frames to wood forms for trimming. Roller in front also protects worker's hands. ***Temco Aircraft Corp***

SCREW-OPERATED GUIDE HEAD FOR ONSRUD TABLE ROUTER improves accuracy, speed, and safety when form blocks are cut. Handwheel controls lateral adjustment, while vertical adjustments are made by sliding guide shaft up or down and retightening. ***Temco Aircraft Corp***



SQUARE SOCKET DRIVE WELDED TO AIR SCREWDRIVER runs up socket screws on Lockheed P2V outer wing panels. Adaptation of air screwdriver, which has torque cutout, speeds assembly but doesn't allow screws to be driven too tight. Screwdriver also has light weight and low rpm. ***Temco Aircraft Corp***

Army Ordnance Corps is spending billions as one of the nation's largest manufacturing organizations. To find out about Ordnance's policies and where metalworking plants fit into its program, *American Machinist* editors submitted a series of questions to Maj Gen E L Ford, Chief of Ordnance. He answers them here



90-MM GUN TUBES, after rough machining, warp out of line. Here, at Firestone Tire & Rubber Co, a 400-ton press is realigning a tube

General Ford Tells the Ordnance Story

With the stretchout of the defense program, will you still build the production facilities which you originally planned?

There has been a slight retrenchment in expansion plans, but no curtailment of projects already started.

Are we really in volume production of tanks, guns and other Ordnance items such as ammunition? If not, when will we be?

We are now in volume production, with an ascending rate month by month. We should reach the anticipated peak by the middle of 1953.

What Ordnance items do you expect to be production bottlenecks and what are you doing to help relieve the situation?

Production bottlenecks have occurred and may be encountered later on in items which do not have an exact civilian counterpart. About 20% of Ordnance's prime contracts for major items are with companies which have never done Ordnance work before. New sources of supply are constantly appearing, particularly among subcontractors. To break bottlenecks, Ordnance is developing new sources, is fostering expansion of existing industries, and is exploring new methods of manufacture. Wherever shortages of machine tools and materials threaten production rates, Ordnance has enlisted NPA's help in improving delivery dates from suppliers.

To what extent are you negotiating contracts instead of asking for competitive bids?

Competitive bidding is the preferred method of procurement in the Department of the Army, of which Ordnance is a part. Certain of our production programs, however, do not lend themselves to formal advertising. In these cases we resort to competitive negotiation. In certain instances in which particular technological processes are involved, or in which research projects are to be undertaken, we use selective negotiation. The result is that a substantial number of Ordnance contracts are placed by negotiation rather than competitive bidding.

Selective negotiation was used in connection with the contract for a new tank transmission currently being made in quantity by Allison Division of General Motors. Allison did the engineering and development work and had the facilities and personnel to produce the transmission in volume at one spot without duplication at other locations.

Royal Typewriter Co is producing Browning automatic rifles as a result of competitive negotiation on a national basis among manufacturers who were technically qualified to do the work. The program's urgency and the types of special tooling required were the reasons for turning to negotiation in awarding the contract. But competition was desirable to get the most advantageous price.

Spare Parts for commercial type vehicles are typical of the items procured by competitive price bidding. Distributors and large dealers throughout the nation have some, if not all, of these parts on hand. The off-the-shelf price is a vital element, as the successful bidders are required to give immediate delivery.

What are you doing in awarding contracts to help relieve the situation in surplus labor areas?

Under provisions of Defense Manpower Policy No. 4, from time to time the Director of Defense Mobilization certifies certain areas to the Department of Defense as surplus labor areas in which it is to the public interest to give preferential treatment in placing contracts. As soon as any such notification is received, Ordnance passes along word to all procurement offices of this

change in status. Firms located in such surplus labor area then may lower their original bids to match the lowest proposal made by a firm outside the area on *negotiated procurement only*, with the following limitations:

a. All small business firms, submitting an original proposal, which are located in a surplus labor area are given an opportunity *in ascending order of dollar value of original proposals* to match the lowest outside proposal.

b. If no small business can meet the outside proposal, the opportunity is given to big business located in the surplus labor area — again in the ascending order of dollar value of the original proposal.

c. First firm in surplus labor area to meet conditions and proposals of outside firm is awarded the contract.

d. Further restriction is that a big business in a surplus labor area may not be given an opportunity to meet the proposal of small business outside the surplus labor area.

e. All preferential treatment ceases when an area is removed from the list of certified surplus labor areas.

In addition to the awards due to preferential treatment, we have awarded a number of contracts to firms in surplus labor areas due to decisions based on such factors as: (1) Technical ability to produce the item, (2) delivery schedule, (3) price, (4) estimated quality of performances, and (5) other practical considerations.

In placing Ordnance contracts, is geographical dispersal of plants a prime consideration or will you put work into congested industrial areas to get the work done?

When production is planned for future requirements and large sums are to be spent and a tremendous number of manhours consumed on new construction to provide an ample industrial base for military output, dispersal is a prime consideration. However, Ordnance has little control over the location of the successful bidder in procurement for current needs through formal and competitive advertising. At present, most of our procurement is for present-day requirements, hence contracts are being freely placed in congested areas. In Industrial Mobilization planning, geographical dispersal is very important. When two or more manufacturing sources are necessary for all-out production, it is not only prudent but mandatory to spread production so that a single enemy effort cannot completely disrupt operations.

What are you doing to spread work by subcontracting?

Nearly all Ordnance contracts must be let to prime contractors by necessity. The matter of subcontracting cannot be controlled. It is our policy, however, to encourage subcontracting. Small business is attracted by means of display rooms in Ordnance procurement offices and by setting up of small business assistance offices. Contractors are not issued priorities for machine tools if work can be successfully subcontracted.

Ammunition and automotive procurement lend themselves particularly well to subcontracting. There are many examples of three-tiered subcontracting in the automotive field. Ammunition components come from a wide variety of industries—electronics, plastics, metalworking, wood and chemical. What's more, the processes involved in the manufacture of ammunition are found in many shops throughout industry. These shops can perform ammunition work with a minimum change of tooling, minimum know-how and relatively small capital expenditures.

Does Ordnance try to control the kinds of manufacturing processes used by its contractors?

Ordnance makes no such attempt except in manufacture of small arms ammunition where the processes themselves have a significant effect upon the performance and stability of the final product.

How does Ordnance coordinate its research and development work with private industry's?

Ordnance resorts to four distinct operations:

(1) Staff men from our research and development agencies serve on working committees of technical societies, such as the SAE, AWS, ASME, and ASTM.

(2) Ordnance advisory committees are recruited from specialized fields to help Ordnance. Outstanding engineers from private industry serve on these committees. A metallurgical advisory committee on titanium, for instance, has been created, and a similar one on armor.

(3) Direct informal contacts are maintained with industrial firms known to be doing research and development work in various Ordnance fields. The leads for such contacts come through technical committee work, Ordnance contracts and constant reading of technical literature.

(4) More than twenty Ordnance integration committees have been established, each comprising contractors for production of a particular Ordnance item or items. The function of each committee, the officers of which are Ordnance personnel, is limited to the immediate problems arising from manufacture of that item. The integration committees perform these invaluable services:

a. Production experience and techniques of each contractor member are made available to all other members of the same group.

b. Facilities of the group as a whole are integrated so as to secure maximum production in the shortest time.

c. Critical tools and materials are controlled and diverted to those contractors with the greatest need for them.

d. Changes in materials and design are introduced with an eye toward uniformity in bills of materials, drawings, specifications and descriptions of engineering changes so as to maintain full interchangeability for all Ordnance requirements.

e. Interchange of materials, skills, tools, training aids, machines and other production necessities is provided.

Integration committees are authorized under Section 708 of the Defense Production Act of 1950. No act or omission to act on the part of committee members may be construed to be within the prohibitions of the anti-trust laws or the Federal Trade Commission Act as long as the acts or omissions take place in regular committee meetings. Under Section 708 the defense production administrator must ask each contractor member to participate in the committee's activities. The request must have the approval of the Attorney General.

Some 190 Ordnance integration committees were formed in World War II. Some of the accomplishments of these committees were: (1) To get production of tank engine starters under way in 10 weeks instead of 10 months; (2) to begin output of mechanical time fuzes in 90 days instead of the usual 12 months; (3) to obtain millions of sets of tank-track components from over 200 small manufacturers with a smooth flow of production.

Integration committees were used successfully for all items throughout

the entire range of Ordnance components up to and including large and complicated fire-control directors.

What is Ordnance doing to help conserve materials in manufacture of its items?

Ordnance is constantly striving to reduce its use of strategic and critical materials to a minimum consistent with sound economy and adequate performance and safety of Ordnance equipment. The principal means used are:

(1) Continuous research, evaluation and study of all classes of engineering materials to secure reliable information about their useful characteristics, properties and limitations. The gathering of data from industry and technical societies is part of this process.

(2) Application of available information about materials in the design of new equipment. Specifications and drawings of all Ordnance standard equipment are restudied periodically for the purpose of using the more critical materials only when it is essential to meet military characteristics and safety requirements and where they will best serve the over-all objectives. Carbon steels, cold-worked steels and low-alloy steels are being used wherever they possess the required properties. Critical alloys thus are saved for such items as guns, AP projectiles and armor where they are indispensable.

(3) Technical advice and assistance of industrial experts in using alternative materials to conserve those which are more critical. The Society of Automotive Engineers, for example, reviews automotive drawings, and armor and gun steels are being studied all the time by Ordnance advisory committees.

Savings made in alloy steels are high-spotted in the following table, which is typical of what Ordnance is doing:

TANK PARTS

SPECIFIC PART	ORIGINAL STEEL	ALTERNATIVE STEEL	SAVINGS IN ALLOYING ELEMENTS FOR ONE QUARTER CURRENT PRODUCTION RATES
Torsion Bar	8740	80B50	3600 # Nickel 1800 # Chromium 2000 # Molybdenum
Wheel Spindle	4340	86B45	16,700 # Nickel 1,900 # Chromium 2,000 # Molybdenum
Center Guide	8745	1340	16,000 # Nickel 14,500 # Chromium 7,300 # Molybdenum
Track Pin	8750	5160	18,200 # Nickel 16,500 # Molybdenum

Are many manufacturers doing development work for you in what is known as "phase 1" and "phase 2"? Please explain how extensive this program is today.

"Phase" contracts are awarded for items which involve difficult production problems, require long lead-time for manufacture, are needed in wartime in quantities exceeding peacetime production capacity for such or similar items, and take large quantities of critical materials.

Phase-1 studies are of an exploratory nature—to overcome production problems, reduce lead time, eliminate critical materials. Phase-2 studies are to set up pilot production lines for items needed beyond peacetime production capacity for such items. Phase-3 studies are for educational orders to industry.

Some 96 studies have been made since March, 1948, in the phase-1 category. At present seven studies are in progress and one is being arranged. As a result of a successful phase-1 studies, 83 phase-2 studies have been contracted for since 1948. Of that number, 63 have been completed, 30 are in progress. There are five phase-3 studies approved. Three of these are in progress, and two are still to be placed.

Are we spending too many man-hours and too much material trying to build superlatively good tanks and other weapons compared with the Russians?

I do not think so. The lives of our men are more important to us than metal. This is not true in Russia. Rather than striving for equipment of top quality, Russia concentrates on effective weapons with a short life span, thereby reducing protection to personnel.

The time and money we devote to research and development is well spent. Before we pick the right equipment for a particular job, we examine carefully all the possibilities. First we test equipment of the simplest type. Then we test more complex types which admittedly are harder to produce and are practical only because of the high average ability of American soldiers to operate such equipment. Our ultimate decision as to how far we should go in actual production is based on these exhaustive tests.

Bear in mind that the use of man-hours and materials is insignificant in the development stage of any Ordnance weapon. They certainly are not wasted. In the end, the degree of complexity in manufacture is apt to be determined by the necessity for qualitative superiority over potential enemies.

Our tanks have up to 150% more fighting space per man than Russian tanks. They require greater precision to manufacture. Their components are of superior quality. Such superiority pays off in longer life for the parts, the problem of supplying spare parts for vehicles in the field thus being minimized.

Tank and SP artillery fire-control instruments were little more than simple periscopes and telescopes in World War II. By contrast, today's combat vehicles have range finders and other refinements which are much more complex to make than periscopes. But the result is improved accuracy in firing and a great increase in the probability of first-round hits.

What are Ordnance designers doing to develop equipment readily adaptable to mass-production techniques?

In engineering a piece of equipment, Ordnance designers constantly bear in mind the production problems involved. They also consider an even more important factor —to provide troops with equipment of maximum quality. Sometimes the need for an item of very high quality leads to production troubles. But this is the exception rather than the rule. When it does happen, Ordnance takes another look at the problem to see if a desirable and practical compromise can be arrived at.

Ordnance insists that the designers in its employ possess a sound general engineering background (a mechanical engineering degree is desirable) and practical experience in their specialty. The designers are encouraged to participate in scientific and technical association activities. They frequently visit contractors' plants in supervising the technical aspects of Ordnance projects. They

thus keep up currently with new processes, methods and materials.

What part if any do prime contractors play in design of Ordnance equipment, like tanks?

Prime contractors are called upon with some frequency to develop and engineer new Ordnance items. Development work, however, often is done by Ordnance itself. Some tanks were strictly the product of the Detroit arsenal when it was under Ordnance management. Others have been designed and engineered by civilian companies from initial layout drawings and characteristics furnished by Ordnance. A notable example is the Patton 48 medium tank designed by the Chrysler Corporation. Thus there is no uniform procedure, the practice varying widely with different items. This situation is a direct outgrowth of the postwar years (1946-1950) during which inadequate funds were available for orderly research and development. It also is attributable to the fact that some Ordnance items have partial counterparts in the civilian economy (motor trucks, for instance) and others do not.

Control of development, design and production engineering was centered in and maintained by Ordnance during World War II. Production needs were so great that all available production facilities had to be used. That was especially true of power plants for major items. Example: M4 series of tanks, in which several types of engines were used to take full advantage of the production facilities of all prime contractors. Today, Ordnance has assigned engineering responsibility for families of combat vehicles to single prime contractors, who handle engineering design, engineering changes and engineering releases, insofar as automotive details are concerned only, to all other contractors making identical or related vehicles. Component parts are handled much the same way. The three major component manufacturers perform the same functions in relation to the automotive component parts (engine and transmission). This procedure results in closer engineering control and in continuity of design, as well as over-all simplification and interchangeability in both manufacture and field service.

Before World War II the average budget of Ordnance for research and development was only about $1 million a year. The postwar budget ran around $45 million. Offhand this may seem like a spectacular increase. But it is not when one considers that a complete new field of weapons has been added to Ordnance's operations—rockets and guided missiles.

Are you satisfied with industry's cooperation in (1) designing new products along with your staff, and (2) accepting Ordnance production contracts?

Industry has cooperated to a high degree in designing new products, especially when the design and development phase revealed possibilities of contracts for volume production. Ordnance has asked industry on numerous occasions to design items and components. Extractors for 90-mm guns are an example. While the basic principle of these extractors came out of Ordnance, the production designs were the result of the combined efforts of such companies as Oldsmobile, Chain Belt, and Wheland Co. Tank tracks developed by Goodyear and Firestone is another example.

What does Ordnance think of the dual-purpose plant as outlined recently by Charles E Wilson of General Motors?

Mr Wilson's dual-purpose plant finds favor in the Ordnance Corps. Proposed legislation to permit long-term defense contracts for this type of plant is a step toward the permanent preparedness so necessary for rapid production of Ordnance items in time of emergency.

What have you done by means of standardization to simplify upkeep of equipment in the field and to make the production job easier?

Ordnance's standardization program has simplified upkeep of combat and tactical vehicles by eliminating many parts and by using the same components in many different vehicles. In the light tank family alone there are 66 interchangeable major components, the engine being counted as only one part. Other common components include transmissions, suspension systems, ignition systems, torsion bars, and batteries.

In World War II, the tactical vehicle fleet was composed of 28 basic vehicles. Ordnance has reduced this number to seven. Whereas 18 engines, 19 transmissions, 21 front axles, 16 rear axles, and 13 tire sizes were needed then, now only seven of each is required. With fewer parts to produce, production is easier.

Standardization has made it possible to shorten the training time of mechanics (they have fewer parts with which to become familiar), to reduce the number of personnel handling parts in rear area depots, and to reduce drastically the number of spare parts stocked.

How much of Ordnance research work is done in its own research centers and how much by industrial or educational institutions?

Some 70% of Ordnance research work is done in its own centers and the remainder by industrial and educational institutions. We ourselves do the work which requires background knowledge of Ordnance material, functions and problems. Most of our basic research is parceled out to educational institutions and nonprofit research agencies.

About 97% of our research activities are in the field of applied research, with the government doing only 17% of the work. Here is a small sampling of research projects:

Carbon nitriding—Sam Tour & Co.

Titanium carbide & zirconium borides—American Electro Metal Corp.

Heat-resistant materials—American Brake Shoe Corp.

Heat transfer in gun barrels—Purdue University

Welding of titanium — Rensselaer Polytechnic Institute

Kinetics of corrosion of metals—University of Utah

Fourteen Ordnance centers are doing applied research. Some examples:

Watertown Arsenal does applied research on steel and titanium armor, projectile steels, heat and erosion resistant materials.

Picatinny Arsenal operates laboratories for studying packaging of ammunition, non-metallic materials and propellant powders.

Frankford Arsenal does applied research in non-ferrous metallurgy, plating and electro-chemical treatments of ferrous metals and alloys for protection against corrosion and protection against fungi.

Aberdeen Proving Ground conducts applied research on ballistics of missiles and organic protective coatings.

Basic research is conducted at two spots. White Sands (NM) Proving Grounds does fundamental research on guided missiles and long-range rockets. Aberdeen (Md) Proving Ground does basic research on the ignition and burning of propellants; subsonic, transonic and supersonic aerodynamics; penetration, fragmentation, detonation and blast; propagation and effects of shock waves; and computing techniques.

News of Metalworking

PACKARD REVAMPS AIM

DETROIT—The "class" market will be the objective of Packard in the future, according to James J Nance, new president of the company. This is expected to remedy the "error" made by emphasizing only the medium-price car in the $2500 range. Packard will focus attention on its Patrician "400" series which sells in the $4000 range.

NEW HAVEN TRIES BUSSES

NEW YORK—Short rail operations under light load may be handled by adaptations of regular city busses in the future. New Haven RR is trying a Mack FCD rail bus on the run from Mansfield to Fall River, Mass, a 17-mile stretch. A 220-hp supercharged diesel engine runs a generator that drives four 55-hp GE traction motors. Support is two four-wheel car trucks with spring mounts, which replace the normal rubber-tired wheels and axles.

BEARING-BALL RESEARCH

Navy Research Laboratory has found that stored ball bearings corrode because of galvanic action, caused by acid from some oils. Action can be slowed by corrosion inhibitors that will neutralize acids as they form.

British Olympia Machine-Tool Show Will Feature More Automatics

LONDON, ENGLAND—Some 2000 machine tools will be on display at the International Machine Tool Exhibition at Olympia, London, Sept. 17 to Oct. 4. About half of the machines will be British-built and the remainder mostly from the Continent. The show will be under the auspices of the Machine Tool Trades Association of Great Britain. It will be the first British show since 1948.

Preliminary reports indicate a significant increase at Olympia in the number of machines with copying attachments, automatic sizing and higher spindle speeds. Many profiling lathes will be shown, emphasis being on hydraulically-actuated units. Copying devices also will be displayed on die sinkers, millers, boring mills, shapers and automatics.

At least two duplicating shapers will be exhibited, one with 8-in. stroke and the other with 72 in. One lathe will have a 9-place templet holder so that many different jobs can be produced without resetting.

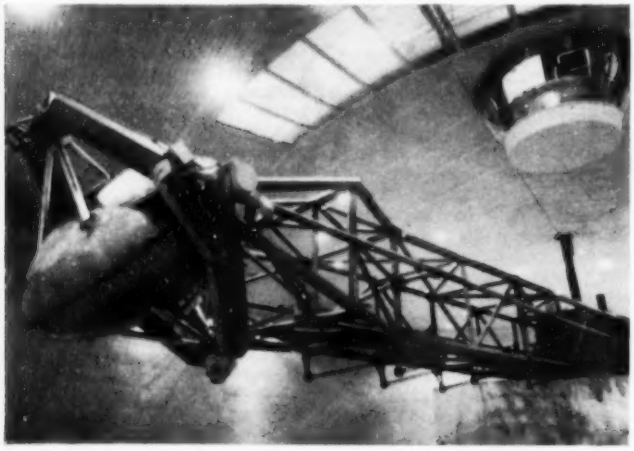
SPECIAL FEATURES

Automatic sizing is being done with electric, electro-hydraulic, and electronic units. Electronics are also being applied in producing stepless variable speeds, particularly on facing lathes, engine lathes, and boring mills where wide variations in diameter are met during a cut. Preselection of speed changes, shown first in turret lathes, are now available on engine lathes, radial drills, and a few other machine tools.

Higher spindle speeds, to handle carbides, are available on a number of lathes. One with 17-in. swing has speeds up to 2410 rpm; another has up to 3200 rpm, and still another, with a 14-in. swing, has up to 3550 rpm. Higher spindle speeds are also evident in internal grinders, several having top speeds over 100,000 rpm. Special turbine-blade machines of several types will be shown.

Greater attention is apparently being given to lubrication—a problem as spindle speeds go up. One machine has water-cooled bearings; another is oil-mist lubricated with oil particles as small as 2 microns.

A universal hydraulic grinder has a triple wheelhead which can be indexed to bring into the working position either a wheel for cylindrical grinding, one on an extension spindle for surface grinding, or one for internal grinding. The machine can be set up for automatic operation and has infinitely variable speeds. Another grinder is designed especially for grinding templet tracers and milling cutters to identical radii—a reflection of the trend to copy-milling.



40 G's can be exerted on human guinea pig with largest centrifuge. Device can accelerate from stop to 174 mph in 6.9 sec. Gondola carries jet pilots to simulate inertia forces in plane for research

US Backs Low-Grade Manganese Plant

WASHINGTON—Manganese, one of the critical alloying elements in special steels, will be recovered from the Cuyuna range in Minnesota by Manganese Chemical Corp. A plant will be built with $1.5 million government loan, plus half a million of private funds. This is the first commercial attempt to recover manganese from the low-grade ore, which has only been worked with experimentally up to now. Manganese shipments from Russia are now practically nil.

MAPI Forms Council for Technological Advancement to Spur Industry

CHICAGO — "To pioneer and promote ideas for a more dynamic economy," the Machinery and Allied Products Institute has set up a Council for Technological Advancement. Its field will cover:

- Marketing of industrial equipment.
- Exchange and promotion of engineering ideas on plant modernization, construction and location.
- Equipment leasing and financing
- Advancement of thinking to reduce industrial cycles
- Industry and college cooperation on research
- Relation of patents to technological advances
- Measuring the effect of inflation on industrial depreciation and replacement policies regarding equipment
- Education of industry on capital-goods economics
- Information program for industry and the public on new products and techniques

The council will be guided by a board of trustees consisting of 38 industrial executives, announced William J Kelly, President of MAPI. Activities will be closely integrated with MAPI.

The staff will be headed by MAPI vice president Alexander Konkle. Headquarters will be in Chicago.

After the Strike—How Does It Go?

LOS ANGELES—Bigger steel inventories than at first realized put most metalworkers here in fair shape right now, but there's little word from the mills on future shipments, so many expect slowdowns in two to six weeks.

SAN FRANCISCO—Defense producers have escaped damage because of the strike, and don't expect much in the future. Civilian producers, though, are apprehensive. Stable production isn't expected for six months, and many manufacturers are slipping back delivery dates 90 days.

CHICAGO—An empty link in the steel supply line is causing worry, but mainly because manufacturers are uncertain how big the hole is, and just when they will be hit by it. One company is putting all lake boats on bringing in ore.

CLEVELAND—Some expensive operations are caused currently by a depleted supply of raw steel shapes, with inventories out of balance. This results in working on steel not suitable for the product in demand, and raises costs quite a bit. One thing producers are thinking about is that the consumer is going to be shocked by the prices for steel products later.

Patton T-48 medium tank sports a 90-mm high-velocity gun with improved optical sights. Tube can be changed rapidly in the field. Chrysler-built V-12 engine turns up 810 hp. Cross-drive transmission and power steering cut driver fatigue. Wide treads provide better flotation. Crew: 4

CALENDAR OF MEETINGS

Sept 4-5—National Conference on Industrial Hydraulics, 8th annual meeting; Sherman Hotel, Chicago.

Sept 7-11—American Society of Mechanical Engineers, fall meeting; Sheraton Hotel, Chicago.

Sept 8-12—National Instrument Conference and Exhibit; Public Auditorium, Cleveland.

Sept 8-12—Industrial Engineering Conference, 4th annual meeting; Michigan State College, East Lansing, Mich.

Sept 8-12—Illuminating Engineering Society, national technical conference; Edgewater Beach Hotel, Chicago.

Sept 10-12—Porcelain Enamel Institute, 14th annual shop practice forum; University of Illinois, Urbana, Ill.

Sept 11-14—Packaging Machinery Manufacturers Institute, 20th annual meeting; The Homestead, Hot Springs, Va.

Sept 24-28—Mexican Machinery Importers Association, national convention; Hotel del Prado, Mexico City.

Sept 29-30—American Machine Tool Distributors' Association, 28th annual meeting; Cavalier Hotel, Virginia Beach, Va.

Sept 29-Oct 1—National Electronics Conference, 8th annual meeting; Sherman Hotel, Chicago.

Sept 30-Oct 3—Association of Iron and Steel Engineers, annual meeting and exposition; Public Auditorium, Cleveland.

Oct 1-3—National Association of Corrosion Engineers; Jung Hotel, New Orleans.

Oct 14-16—Industrial Packaging and Materials Handling Exposition, 7th annual meeting; Coliseum, Chicago.

Oct 18-24—National Metal Congress & Exposition, 34th annual meeting; Convention Hall, Philadelphia.

Oct 19-24—American Welding Society, fall meeting; Bellevue-Stratford Hotel, Philadelphia.

Oct 22-24—Porcelain Enamel Institute, 21st annual meeting; Greenbrier Hotel, White Sulphur Springs, West Va.

Oct 29-31—American Society of Body Engineers, seventh annual technical convention; Rackham Memorial Bldg, Detroit.

Oct 29-31—American Institute of Electrical Engineers, fifth annual machine tool conference; Hotel Ten Eyck, Albany, NY.

MACHINERY IMPORTERS FORM ASSOCIATION

NEW YORK—Leading importers of European-built machinery have formed an association, aiming to provide quality supervision and to insure service and spare parts to US buyers. Members have subscribed to a code of ethics that will meet US trade standards.

These officers were elected at the first meeting:

Milton D Thalberg.....Pres
George R Vonderahe.....VP
Henry A Nau.....Second VP

Charter members are Eric R Bachmann, British Industries Corp, Ferrostaal Overseas Corp, H E B Machine Tools, MBI Import-Export Co, Kurt Orban Co, Permasco Div, Perrish Steel Products, Stokvis-Edera & Co, and Triplex Machine Tool Co.

PICKETS NICK MOVING PLANS

CLEVELAND—Decentralization has caused a strike at Cleveland Wire Spring Co, where a UAW-CIO picket line has been set up to prevent the company from moving machines and equipment from one of its production lines out of the plant. Company objective is to move that line to rural areas where labor is cheaper. Union demand is to keep all operations in Cleveland or shut down plant completely. Although the plant has been closed because of steel shortage, about 35 employees normally work the equipment under fire. Company court action will attempt to get the equipment out without further trouble with the union.

DIEMAKER SHORTAGE NOTED

NEW YORK—A recent survey by NTDMA disclosed a shortage of 20,000 skilled tool and die makers in 22 tooling centers throughout the country. Some 2500 contract tool-and-die shops in the country hire about 45,000 men who can be classified as skilled. These are spread thin, according to NTDMA President Randolph Cope, and are generally working 50- to 60-hr weeks. Expected business for the remainder of the year is high, about half a million in dollar volume for the contract shops.

Crippled WSB Faces Trouble in Coal, Copper, and Shipbuilding

WASHINGTON—The third Wage Stabilization Board, severely crimped by Congress in responsibility, function, and funds, cannot issue new regulations and policies, so it will have little of real value to do. It will be involved, however, in forthcoming labor disputes in the coal, copper, rubber, and shipbuilding industries.

Still in control are the industrial, AFL, and CIO members of the old board, which was abolished because of its handling of the basic steel dispute. But there are new faces on the 'public' side of the board, including chairman Archibald Cox.

Mr. Cox, a Harvard law professor, has been co-chairman of WSB's construction-industry stabilization commission, which got up a policy permitting wage increases of 15¢ and welfare benefits of 7½¢ in that industry this year.

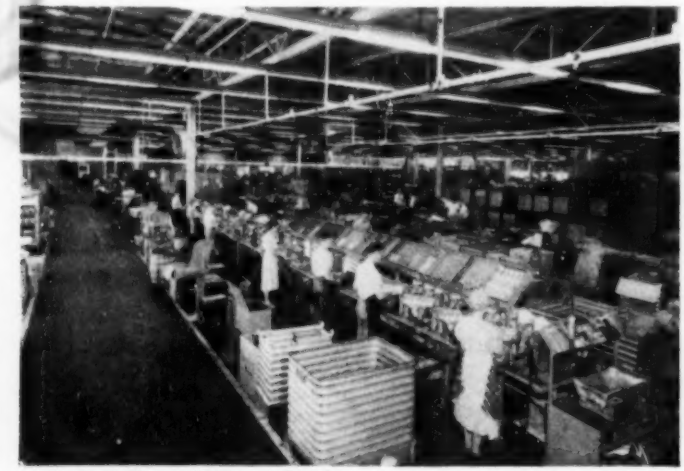
IMPORTANT CHANGES

In these respects, the new board is not like the old: WSB can't now involve itself in wage or other labor disputes, but can only give advice, on request, on how its policies apply to a specific situation. For example, North American Aviation and UAW-CIO have agreed to arbitrate their dispute over wages with the understanding that the arbitrators must OK their decision with WSB. Therefore, WSB has the power to advise the board of arbitrators if the decision meets with its stabilization rules.

Neither WSB nor the Salary Stabilization Board has authority over the wages of farm workers, any wages up to $1 an hour, or compensation of most professional engineers, architects, and public accountants. Also decontrolled, with exceptions, are wages and salaries paid by small businesses with eight or less employees.

Exceptions, where controls are still in effect, include tool and die and patternmaking shops, and new shops that will hire more than eight.

New regulations and policies will be issued by Economic Stabilizer Roger L Putnam on recommendation of WSB. Thus, wage and price controls will be brought closer together under Mr Putnam, whose office is ultimately responsible for both. Enforcement of controls has been consolidated in a single national enforcement commission in this office, whereas WSB and SSB used to go their separate ways.



Large tools are being produced at new Black & Decker 100,000-sq ft plant at Hampstead, Md. Lighting level is 50 fc; may be increased if desirable. Air and electrical power lines are overhead, keeping wood-block floor clear for easy rearranging of production lines

Tool-Bottleneck Break Aids Canada

TORONTO—M-41, which promises to help US machine-tool buyers get equipment for some non-defense needs, has also spurred Canadian hopes for a continued general boom in all business. In the first four months of this year, Canada imported $16.1 million worth of machine tools from this country. Orders are now down from last year, but business expectancy is high.

More Humidity Control To Metalworking Shops

A large part of 1952's volume of $15 million worth of air-drying equipment is going to metalworking plants. Increasing in importance are such uses as in storage rooms, tool cribs, and production shops where moist air ruins equipment rapidly.

DISTRIBUTORS NAMED

Ajax Electric Co has appointed Samson Sales Co, San Francisco, to handle electric-furnace sales in northern California and Nevada. Also named is Richards - Conant, Denver, Colo, to handle sales in Wyoming, Colorado, Utah, Arizona, and New Mexico. W E Hartley, Seattle, Wash, will handle the line in Washington, Oregon, Montana, and Idaho.

Allen-Bradley Co has commissioned Robert P Smith & Co, Jacksonville, Fla, to handle motor-control sales in Florida.

American-Ft Pitt Div, H K Porter Co, has designated Sales Engineering Co, Salt Lake City, Utah, to sell springs in Utah, Nevada, Wyoming, Montana, and Idaho. John J Gillis Co, Boston, Mass, will handle the line in New England.

Ampco Metal, Inc, has announced Western Oxygen Co, Seattle, Wash, for Seattle, and H J Shockey & Assoc, Dayton, O, for Dayton, as distributors of welding equipment in those areas.

Carboloy Dep't, General Electric, has appointed Acme Saw & Supply, San Diego, Calif, to represent the company in the San Diego, Imperial County area. Also appointed is Squier, Schilling, and Skiff, Inc, Newark, N J, to represent in northern New Jersey.

Supreme Products, Inc, has appointed T C Carney Co, Chicago, to represent their line of chucks.

Centric Clutch Co has announced that Jack P Williams, Chicago, will handle their line of couplings.

Colonial Broach Co will be represented in Buenos Aires, Argentina, by C E Thomas.

Conoflow Corp has appointed Bruce Greaves Co, St Louis, to handle their line of pneumatic control equipment in eastern Missouri and southwestern Illinois. Instrument Sales Co, Seattle, Wash, will handle the line in the Pacific Northwest.

Control Engineering Corp has designated Peacock Brothers, Ltd, to distribute pressure-measuring equipment in Canada.

Cushman Chuck Co has appointed John E Hathaway, Cleveland, to represent the company in Ohio.

Cullman Wheel Co has Thomas A Harvey, Glendale, Calif, to represent their power-transmission line in California, Arizona, and Nevada.

Apprentices Get New Draft Protection

WASHINGTON—Selective Service has issued revised regulations covering apprentices, including machinists and toolmakers, to give them wider exemptions. But the apprentice systems under which the apprentices are working must run a gamut of acid tests before deferment applications can be approved.

First, the apprentice program must have been in full effect for a year before application for deferment is made. Second, it must be an established program that requires practical training of 4000 hours in a trade that traditionally requires apprenticeship learning. Third, it must have a program sponsor, who can be an employer, a trade union, a committee, a group of employers, or an association of journeymen. Sponsors must apply to the state director of selective service for program OK.

Once a program is approved, the apprentice must apply to the local draft board on form 171 for deferment. Both apprentice and sponsor sign the application and indicate the authority that approved the program.

One catch the apprentice must consider is that, if deferred, he automatically becomes eligible for service up to age 35, while he is only liable to 27 if he is never deferred and never called.

There are about 350,000 now deferred because of occupation. This group is expected to be increased in the future.

Machine-Tool Productivity Rises

WASHINGTON—Productivity per manhour increased 3% in the machine-tool industry during 1950, latest year for which US Department of Labor has complete figures. A Bureau of Labor Statistics study also noted that a shortage of skilled labor prevented an even higher productivity increase. Main reason for the climb was much better business and the spur of the Korean War.

Productivity in machine-tool building has followed a curve that closely indicates business activity. Figures for the last few years (below):

Output level is not yet to the war peak in 1942, but one major cause of this is the increase in indirect cost per unit produced. These figures run from a low of 94.1 in 1942 (1939 taken as 100.0) to 121 in 1945, 120.3 in 1949, and 115.2 in 1950.

Trend of productivity in 50 companies studied by BLS is still going up, and should be expected to continue as worker skill increases generally as long as the pressure is on for defense goods. Retooling and modernization are other factors in the expected productivity climb.

TOOL PRODUCTIVITY

Year	Output/ Manhour
1939	100.0
1942	110.1
1945	97.3
1948	89.6
1949	92.7
1950	95.3

Mechanical mounts for twin 26-ft coronographs have been completed by Westinghouse Electric's Sunnyvale plant. Installations will be 600 mi apart in the Rockies, where instruments will take stereoscopic photos of sun's corona for analysis

OPS Revision Simplifies Pricing

WASHINGTON — Defense contractors have gained a break on OPS orders. Pricing procedures have now been assembled by OPS into one comprehensive order: Revision 1 of General Overriding Regulation 2.

The revision is designed to clear up confusion on regulations concerned with prices, and also adds some new changes.

Revision 1, GOR 2, shifts many items from one exempt classification to another. Parachutes and pyrotechnics, for example, which were formerly exempt from controls, are now exempt only if they are currently designed to meet military needs exclusively.

Another provision requires a seller of non-exempt items to state ceiling price along with his bid of contract offer.

The whole array of orders up to now has required many manufacturers to look into one regulation to determine whether his product is covered, another to find how his price should be fixed, and a third to find out how and what information he had to file. Dozens of amendments complicated the process still further. Now, all this is simplified.

The revised regulation also prescribes a new procedure for getting ceilings on non-exempt commodities. A producer used to have to get ceiling approval before selling or collecting money. Now, he can file the contract, then collect up to 75% of the proceeds without OPS approval. However, final settlement must wait on OPS action.

The definition of "defense agency" is expanded to include the emergency procurement service of the General Services Administration and the Defense Materials Procurement Agency.

AMERICAN REBUILDERS STALLED

WASHINGTON—American Rebuilders Association, Inc. has temporarily suspended activities because of a lack of interest and backing, although the suspension is expected to last only for six months or so. Leonard Morey of Morey Machinery Co will retain the records of the association.

SHIP TO HAWAII BRINGS BACK TINPLATE

SAN FRANCISCO—SS Alaskan has been chartered by American Can Co to rush Hawaiian tinplate for food canning here to make up for the steel strike. Pineapple canners on the islands will have their stocks replenished before the crop there comes in.

OIL INDUSTRY BECOMES BIG ALUMINUM USER

Surveys by Reynolds Metals Co indicate the oil and gas industry is becoming one of the largest users of aluminum. Oil-field structures can be reduced in weight to improve portability, and equipment trucks can be lightened, which may bypass some state road laws against them.

Both bearings take the same load, yet one has an area of 2 sq in., the other has 30 sq in. Charles L McCuen, General Motors VP and Gen Mgr of GM Research Laboratories (left) and Arthur F Underwood illustrate bearing progress in 25 years. Improvement is 1500% in load-carrying ability

Metalworking Abroad

(By McGraw-Hill World News)

Brazil May Get Auto Plant—Standard Motor Co in Coventry, England, is planning an $8.4-million manufacturing and assembly plant near Santos, Brazil. Financial backing will be mainly Brazilian, although Standard will keep a sizeable interest in the operation.

Mexico Seeks German Steel Plants—Four representatives of the Ministry of National Economics are touring West Germany to buy five complete steel plants. Expected cost: $5 million each. Expected yearly production: 300,000 tons.

Italy Plans Jet-Airplane Factory—Semi-official announcement discloses a projected aircraft plant in Sardinia. Another plant in Milan, where Bell D-1 helicopters are to be built, has received 100 Franklin engines as power plants for the first models.

British Railways Order Giant Wagons—Two cars with 24 wheels, 94 ft long, and with a capacity of 135 tons each will carry heavy electrical transformers. They feature traversing mechanisms to shift the loads to either side to pass bridges and signal posts.

Holland Exports Nodular-Iron Castings—Agricultural products, parts of draglines, and crankshafts of diesel engines up to a 70-in. length are being cast in Doesburgh by N V Ubbink & Co. Part of the production is being exported.

Spanish Firm to Get German Aid—Machinery and technical advice of two German companies will go to the largest steel plant in Spain—Altos Hornos de Vizcaya. German engineers will work for low Spanish wages, but will receive premiums from their own companies.

Australian Truck Plant Starts Up—International Harvester's $2-million factory at Dandenong is producing 25 vehicles a day. Four models will be sold in Australia and South Asia.

European Offshore Contracts—$684 Million—US armed forces have placed that amount in contracts for ammunition, explosives, and a few vehicles in the last year; mainly in the last three months. Navy has contracted for a number of auxiliary combat ships.

George H Acker

Wallace E Anderson

Lawrence J Kline

John W Queen

Names in the News

George H Acker has been elected executive vice president of the Cleveland Worm & Gear Co, and its subsidiary, the Farval Corp. Mr Acker, associated with the organization since 1923, has been serving as vice president in charge of engineering for the past ten years.

George C Houck has been elected vice president for operations, Harris-Seybold Co of Cleveland and Dayton. Mr Houck formerly served as assistant to the president, and was planning director for the company. **W Ray Spiller,** formerly chief engineer, has been named vice president, engineering. **Ren R Perry** has been promoted from general sales manager to vice president, sales.

George K Cassady has been appointed assistant general sales manager of Giddings & Lewis Machine Tool Co, Fond du Lac, Wis. He had been serving as assistant to the sales manager.

W Wentz Alspaugh has been named sales engineer of the Ohio Knife Co, Cincinnati. Mr Alspaugh, formerly connected with E W Bliss Co, will make his new headquarters in Salem, Ohio.

William Rogers Herod has been elected a vice president of General Electric Co; he will continue as president of the International General Electric Co, which he has headed since 1945. Mr Herod, who has been a member of the parent company staff since 1919, was appointed coordinator of Defense Production, North Atlantic Treaty Organization, in 1951, and served for a year in that capacity with the rank of minister.

Wallace E Anderson has been named division supt of the newly-created Precision Tool & Gage Div, Brown & Sharpe Mfg Co. Mr Anderson, who served as a technical adviser to the War Production Board on machinery and tools during World War II, has most recently been associated with the company's sales organization. **Samuel H Waughtel, Jr,** has been appointed division foreman.

Lawrence J Kline has been elected general manager of Amgears, Inc, Chicago. Mr Kline had been vice president and general manager of Mercury Mfg Co, and prior to that had served as general manager of Automatic Transportation Co, a division of Yale & Towne.

Robert M Critchfield has been elected a vice president of General Motors Corp and a member of the administration committee. Mr Critchfield has been serving as general manager of the Pontiac Motor Div.

E Swain Russey has been elected president of the Warner Gear Div of Borg-Warner Corp, succeeding **A P Emmert,** retired. A member of the firm since 1925, Mr Russey had been vice president and general manager for the past eight years. **T J Ault, William H Cortwright, John C Oesterle,** and **Andrew W Rose** were appointed vice presidents of the organization.

Howard B Carroll has been appointed assistant sales manager of Sheldon Machine Co, Chicago. Mr Carroll was connected with Ford Motor Co, and with Manufacturers Engrg Corp before joining the Sheldon sales dept in 1950.

John W Queen has been appointed manager of the Cleveland plant of Joseph T Ryerson & Son, Inc. Mr Queen joined the sales staff of the company in 1933 at the New York plant; in 1947 he moved to Chicago as manager of the alloy steel division.

Dr Soren H Mortensen, chief electrical engineer for the power dept of Allis-Chalmers Mfg Co, and his assistant, **Fraser Jeffrey,** have retired from the organization. Both men are widely known through their numerous technical writings and design contributions to the field.

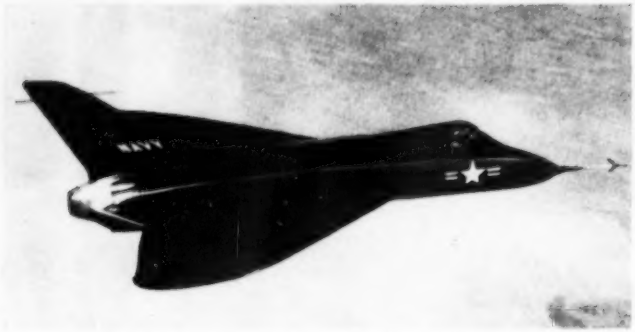
Joseph P Crosby, vice president of Lapointe Machine Tool Co, Hudson, Mass., and vice president of the American Society of Tool Engineers, will represent ASTE at the International Machine Tool Exposition in London, Sept 17-Oct 4, and the Hanover Machine Tool Show to be held in Western Germany, Sept 19 and 20.

K C Gardner, Sr, has been named chairman of the board and chief executive officer of United Engrg & Foundry Co, succeeding the late **F C Biggert, Jr. Geoffrey G Beard,** formerly executive vice president, has been elected president and general manager. **K C Gardner, Jr,** has been named executive vice president and will continue in direct charge of plant operations. **Maurice P Sieger** has been appointed vice president and senior engineer.

Walter S Schamel has been appointed district manager of the Los Angeles office of American Wheelabrator & Equipment Corp. Mr. Schamel has been serving as assistant technical director of the company's dust and fume control division, with which he has been connected for the past six years.

(Continued on page 225)

subcontracting NEWS



Skyray, named for the ocean-going devilfish which it resembles, is the Navy's new jet-propelled F4D. This is the first air photo of the carrier-based interceptor, now undergoing flight tests, which will be produced by Douglas Aircraft's El Segundo, Calif., Div. Thin planform or "delta"-type wing, plus a huge, advance-design jet engine permits the Skyray to climb rapidly to high altitudes

Contract-Letting In Labor Surplus Area Presents Problems

WASHINGTON—Defense planners are finding that military contracts placed in labor-surplus areas are a good idea for national stability, but that there are plenty of problems involved, including some regarding prices.

Procurement officers have orders to place contracts where unemployment is high whenever possible. Department of Labor recommends these locations to ODM, which certifies them as critical. Then procurement officers have some leeway in negotiating terms that might not be acceptable to the government except for the fact that the areas do have considerable unemployment.

Contracts are normally placed by negotiation, but some are placed by solicitation, where bidders from labor-tight areas are not let in on the deals.

Thus far, the military has placed contracts in certified areas amounting to nearly a billion in value, of which $21 million has gone in contracts where manufacturers in labor-surplus areas have met bids from other producers in areas where unemployment is no problem. These few contracts were on what is called a "preferential-treatment basis."

The balance of contracts were placed in labor-surplus areas even though better bids might have been obtained elsewhere.

Since contract letting in high-unemployment areas started three months ago, only six areas have been shifted from the critical list to the class III list—regions of only moderate unemployment. These are Muncie, Ind; Reading, Pa; Bay City, Mich; Detroit, Grand Rapids, and Flint, Mich.

70% of Tooling Subcontracted

PHOENIX, Ariz.—Small business production facilities here are doing a million-dollar volume as subcontractors for AiResearch Mfg Co of Arizona by supplying 70% of the tooling and much of the fabricated parts needed to turn out the company's finished products.

Subcontracting activities are scheduled to grow later this year when assembly of small gas turbine compressors and air turbine starters begins in the $5 million Phoenix plant.

Columbia-Geneva Enlarging For Army Tank Program

SAN FRANCISCO — Columbia-Geneva Steel Div of US Steel has signed a contract for the restoration and rearrangement of the federally-owned defense plant foundry at Pittsburg, Calif.

$9.5 million worth of new facilities will be installed so that adequate foundry capacity may be available for production of armor steel hull castings for the Army tank program.

American Locomotive Co To Turn Out Patton Tanks

SCHENECTADY—The American Locomotive Co has received a $200-million order for T-48 tanks and spare parts; this newest Army medium tank is scheduled to come off assembly lines during the first half of 1953.

The Patton tank contract raises the company's total backlog of defense work to approximately $950 million. Alco has currently substantial orders for the M-47 tank, being turned out at volume production.

Subcontractors Get 46% of Each Air Force Prime Contract Dollar

LOS ANGELES — Although only some 10% of the Air Force business is of a kind that can be offered directly to prime contractors in the small business class—less than 500 employees—smaller firms get a high percentage of the 90% of the contracts awarded major prime contractors.

Under-Secretary of the Air Force Roswell L Gilpatrick, speaking to a meeting of small business representatives in Los Angeles said that a recent survey of the Aircraft Industries Association indicated that about 46% of each prime contractor's dollar was placed with subcontractors and suppliers.

He pointed out that AF funds must be utilized to the best possible advantage, and emphasized that "small business concerns must not lose sight of the necessity for aggressive sales effort."

Luscombe Overhauling F-47's

DALLAS—Luscombe Airplane Corp has begun overhaul of components for Air Force F-47 Thunderbolt fighters, under contract from TEMCO Aircraft, parent company.

Contract, which involves more than 200 of the mothball planes, calls for reconditioning of wings, landing gear, horizontal and vertical stabilizers, elevators and rudders.

The company is installing tooling and equipment for the job in a recently completed extension of the main factory building which added more than 40,000 sq ft of space to the facility.

LATEST DEFENSE CONTRACTS

ARMY ORDNANCE AWARDS

Chicago Ordnance District

Madison-Kipp Corp, Madison, Wis.—fin assy for mortars, $504,823.

Studebaker Corp, South Bend, Ind.—trucks and parts, $13,684,373.

Bell & Howell Co, Chicago—periscopes, $2,354,010.

Watervliet (NY) Arsenal

Lycoming-Spencer AVCO Mfg Corp, Williamsport, Pa.—vents, $371,225.

Century Engrg Corp, Cedar Rapids, Iowa—brakes, muzzle, $175,211.

A B Farquhar Co, York, Pa.—shock absorbers, $104,745; plate, base, $215,246.

Springfield (Mass.) Armory

Noble Mfg Co, Inc, Haydenville, Mass.—gear; ejectors, link, bolts actuators, $129,375.

Royal Typewriter Co, Hartford, Conn.—guard, trigger assy, $751,976.

Goodrich Mfg Co, San Francisco, Calif.—tool assy, $379,400.

Rock Island (Ill.) Arsenal

Birtman Electric Co, Rock Island, Ill.—arm, indicator assy, $161,264.

Gram & Westergaard, Chicago—exerciser, recoil mechanism, $123,905.

Detroit Ordnance District

General Motors Corp, Truck & Coach Div, Pontiac, Mich. — automotive tank parts, $370,737.

Continental Motors Corp, Detroit — cooled engines, $201,210.

New York Ordnance District

Mergenthaler Linotype Co, Brooklyn, NY—periscopes for interim system, $284,061.

Daystrom, Inc, Elizabeth, NJ—alternate fire control systems, $10,790,165.

Sperry Gyroscope Co, Long Island, NY—velocimeter and parts, $138,975.

Detroit Arsenal

Tyson Bearing Corp, Massillon, Ohio—roller bearings, $120,520.

Fisher Body Div, General Motors Corp, Detroit—turret assy, $436,719.

General Electric Co, Milwaukee, Wis.—X-ray apparatus, $144,000.

Bogue Electrical Mfg Co, Paterson, NJ—blower assy, turret ventilating, $170,654.

Minneapolis Honeywell Regulator Co, Minneapolis, Minn.—box assy, override motor control, $832,102.

NAVY AWARDS

Bureau of Aeronautics, Washington 25, D. C.

American Machine & Foundry Co, New York—silver zinc batteries, $152,000.

Mitchell Camera Corp, Glendale, Calif.—camera bodies, $286,297.

Bendix Aviation Corp, Eclipse Pioneer Div, Teterboro, NJ—cranking starters, $156,446.

Ships Parts Control Center, Mechanicsburg, Pa.

Electric Auto-Lite Co, Toledo, Ohio—motor assys, $206,616.

Westinghouse Electric Corp, Philadelphia, Pa.—electric motors, $155,463.

Yards & Docks Supply Office, Port Hueneme, Calif.

LeRoi Co, Milwaukee, Wis. — compressors, $107,755.

Northwest Engrg Co, Chicago — crane, crawler booms, $135,683.

Navy Purchasing Office, New York

Mimar Products, Inc, Brooklyn, NY—electric fans, $253,000.

Superior Magneto Corp, Long Island City, NY—wrist compasses, $253,000.

Fee & Stemwedel, Chicago—wrist compasses, $230,295.

Le John Mfg Co, Washington, DC—electric fans, $120,199.

Fulton Mfg Corp, Wauseon, Ohio—tubular flashlights, $188,181.

Industrial Tool & Machine Co, Georgiaville, RI—rod and bearing assy, $119,000.

James G Biddle Co, Philadelphia, Pa.—resistance indicators, $133,821.

ARMY SIGNAL CORPS

Philadelphia Supply Agency

Canadian Commercial Co, Washington, DC—dials, $724,632.

Steward-Warner Electric Div, Chicago—receiver transmitters, $638,820.

Trav-ler Radio Corp, Chicago — mountings, $175,259.

Rudolph Wurlitzer Co, North Tonawanda, NY—converters, $104,100.

Pioneer Electric & Research Corp, Forrest Park, Ill.—automatic testing units, $270,493.

Collins Radio Co, Cedar Rapids, Iowa—diversity receiving equipment, $274,000.

Hoffman Labs, Inc, Los Angeles—frequency shift converters, $980,724.

Modecraft Co, Brooklyn, NY — antenna masts, $565,468.

J H Holan Corp, Cleveland, Ohio—trucks, $181,499.

Howard C Rife, Inc, Philadelphia—motors, indicators, $124,100.

General Electric Co, Syracuse, NY—crystal units, $595,433.

P R Hoffman Co, Carlisle, Pa. — crystal units, $293,259.

New London Instruments Co, New London, Conn.—panoramic adapters, $207,445.

Maspeth Telephone & Radio Corp, Brooklyn, NY—repeater sets, $387,591.

AIR FORCE AWARDS

Air Materiel Command, Dayton, Ohio

US Gauge Div, American Machine & Metals, Inc, Sellersville, Pa. — transmitters, $595,486; gages, $148,127.

Bendix Aviation Corp, Baltimore, Md.—components, $17,780,000.

General Electric Co, Schnectady, NY—tachometer indicators, $231,185.

Walter Kidde & Co, Belleville, NJ—cylinder and valves assys, $173,078.

Eclipse Pioneer Div, Bendix Aviation Corp, Teterboro, NJ—transmitters, $475,812.

Chicago Pneumatic Tool Co, Detroit — stationary air compressors, $323,385.

Collins Radio Co, Cedar Rapids, Iowa—communication receivers, $155,484.

General Electric Co, Dayton, Ohio—induction voltage regulators, $321,940.

Portable Electric Tools, Inc, Chicago, Ill.—phase inverters, $1,827,851.

S S Co, Brooklyn, NY—portable welding kits, $156,340.

Handley Brown Heater Co, Jackson, Mich.—bomb racks, $144,364.

Barlor Metal Products, Goshen, Ind. — wall lockers, $1,294,348.

Simmon Brothers, Inc, Long Island City, NY—processing equipment, $217,318.

Houston Fearless Corp, Los Angeles, Calif.—processors, $1,311,790.

Weaver Mfg Co, Springfield, Ill. — brake testers, $163,596.

Courier Electric Products Inc, Grand Rapids, Mich.—amplifiers, $140,435.

Camfield Mfg Co, Grand Haven, Mich.—antennas, $306,461.

American Automatic Typewriter Co, Chicago, Ill.—dryers, $139,243.

Advertising Displays, Inc, Covington, Ky.—ventilator kits, $1,090,334.

Randall Mfg Inc, New York — degreasers, $193,193.

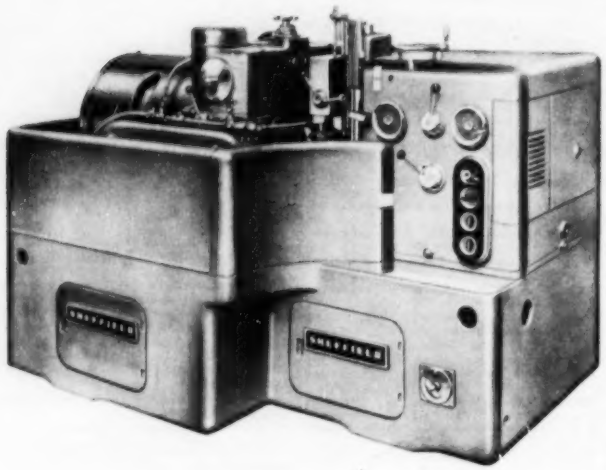
The Cornelius Co, Minnesota, Minn.—regulating valves, $101,528.

Walty Furnace Co, Cincinnati, Ohio—electric furnaces, $233,900.

Jack & Heinz, Inc, Cleveland—phase inverters, $244,642.

Cold test specialists at Northrop Aircraft's Anaheim Div wear these protective outer garments while performing low-temp analysis of the T-41 optical tank range finders. To determine their reaction under extreme conditions, these "seeing eyes" for the Army's new M47 tanks are literally frozen in an insulated chamber at temps ranging as low as –85 F to test optical instruments before delivery to the Ordnance Corps for installation in tanks

New Shop Equipment



Sheffield Gear Grinder Uses Helical-Ribbed Wheel

The grinding method used on this machine is unique in that the periphery of the wheel is formed with a helical rib by a combination of Crushtrue and diamond dressing. The gear blank, mounted on a mandrel between vertical dead centers, rotates continuously at a set rate in direct relationship to the grinding wheel. Work drive and wheel drive are interconnected by gearing which can be changed easily as required by the number of teeth to be ground.

Work can be removed from the machine without stopping the grinding wheel. When replaced, it is automatically properly located without further adjustment. Two additional sets of gears provide for selecting the helical lead and for controlling the speed at which the work is fed past the wheel.

The work rolls across the full width of the wheel so that the involute form is generated automatically without further adjustment after initial setting. The need for indexing is completely eliminated. The continuous rolling motion distributes wear evenly across the face of the wheel, preserving accuracy of wheel form. Thus, frequent redressing of the wheel is unnecessary.

Gears can be up to 8 in. dia with maximum length of tooth 4 in. Pitch range is from 8 to 50 diametral; maximum helix is 45. Helical and spur gears of the same pitch can be ground with the same wheel without redressing. The helical-ribbed wheel enables any dia gear to be ground of similar diametral, circular, or module pitches without any additional setting up of the machine except for changing gears for the proper number of teeth and repositioning the wheel for the new dia.

Accuracy of the work largely depends upon the accuracy of the Crushtrue and diamond wheel dressing. Both of these are performed automatically.

Sheffield Corp, Dayton 1, Ohio

High-temp furnace has the following features: (1) built for 2200-F operation, (2) non-flaking, non-oxidizing high-temp alloy elements, (3) high-temp insulating refractories backed up by high temp insulation, (4) built in various sizes 8 in. wide, 12 in. high, 10 in. deep to 30x36x72 in.

K H Huppert Co, 6830 Cottage Ave, Chicago 37, Ill.

Grade-608 Chrome Carbide has Steel Thermal Expansion Rate

Grade-608 Chrome Carbide, the first of the new Series-600 Carbides (see *AM* Oct. 29, '51, p. 151) has extra-high resistance to corrosion, erosion, and abrasion. Made by powder metallurgy, it has a density half that of tungsten carbide, a coefficient of thermal expansion approximately the same as steel, is completely non-magnetic, and has extreme resistance to high-temperature oxidation. Its composition is 83% chrome carbide, 2% tungsten carbide, and 15% nickel.

Generally the same method used in fabricating tungsten carbide is used for Grade-608 Chrome Carbide. Components can be molded to shape for standard or quantity parts. They can also be economically machined to required shapes in the presintered condition for small-lot production. Grinding, lapping and polishing of chrome carbide is performed with conventional silicon-carbide grinding wheels, diamond grinding wheels, and diamond lapping compounds. Polished surfaces have a more brilliant luster than those of tungsten carbide.

The Grade-608 can be attached by brazing, by mechanical means, or by thermo-setting resin cements. It is necessary to flash-plate chrome-carbide parts with nickel when brazing with conventional materials.

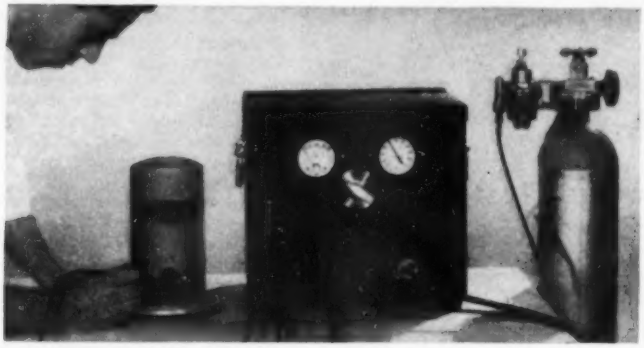
Bond shear strength of from 5000 to 8000 psi at room temperature have been obtained with ethoxyline cements, using various curing methods. At 200 F, bond strengths decrease to one-half the above values. Prolonged immersion in water weakens the bond about 15%.

Because chrome carbide has about the same thermal expansion rate as steel, plus wear and corrosion resistance, it is finding wide application in the gage field.

The non-magnetic properties of Grade-608 mean that it is possible to make instrument components that are non-magnetic and yet highly resistant to wear and corrosion. Many applications for the new chrome carbide will be found where mechanical parts must resist wear, corrosion, high temperatures, or erosion.

Carboloy Dept, General Electric Co, Detroit 32, Mich.

Materials and Parts



Cutting Process Uses Stream of Gas-Propelled Abrasive Particles

Cutting process performed by the Airbrasive unit involves use of a high-velocity stream of gas-propelled abrasive particles directed against a work surface to perform a variety of operations.

Applications include controlled removal of metallized film from glass and ceramics, drilling thin sections of hard-to-work metals, cutting extremely hard or brittle substances, etching, light deburring, and polishing.

Stream is propelled through a sintered tungsten-carbide nozzle; it travels at approximately 1100 fps with an initial dia of 0.018 in., resulting in extremely fast and accurate cuts. The process is said to be markedly faster on certain jobs and materials than other cutting methods, including diamond tools.

Cutting action is accomplished without increase in temp, pressure, or vibration, making it particularly applicable to materials such as germanium, physical or electrical properties of which might be affected by heat and shock. Absence of direct tool contact with the work eliminates dimensional variations caused by wear of cutting tool or surface irregularities in the work.

A specially processed aluminum-oxide powder is used as the abrasive; any dry, inert gas can be used as the propellant.

Unit operates on a 110-v, 60-cycle ac; dimensions are 8½x15x12½ in., net weight, 42 lbs. In addition to necessary detachable connections, spare parts and test equipment, unit is supplied with two right-angle nozzles for manual operation, and one straight nozzle to be held in a fixed or automatically-operated jig for production work.

S S White Industrial Division, 10 E 40th St, New York 16, NY.

Reliance Totally Enclosed Motor Is Dual-Cooled

Totally enclosed dual-cooled motor is equipped with a heat exchanger as an integral part of its frame. A 1½-hp, three-phase, 60-cycle motor built into the heat exchanger runs at 3600 rpm to drive internal and external fans independent of the main motor itself.

The heat exchanger sections are cast aluminum with both internal and external fins for maximum heat dissipation. Air velocity through the internal sections of the exchanger is 2900 fpm. In the external path between the cover and the exchanger bank the air is pumped at 3300 fpm.

The use of wide exposed aluminum fins, plus the high velocity at which the air is swept past them, tends to keep them clean. Also, a cover can be easily removed to clean the exposed fins.

Because cooling efficiency has been increased, use of smaller motors for a given hp is possible, The totally enclosed motors range up to 1500 hp.

The Reliance Electric & Engineering Co, 1088 Ivanhoe Road, Cleveland 10.

...INCLUDING

Resistance-wire coiler has a photoelectric-cell for cutting-knife control .....page 161

Torque tester detects defective ball bearings by measuring torque during rotation.....page 160

Plastic-dot work glove outwears plain flannel by over two to one, yet retains lightness....page 163

Scope for optical tooling has eyepiece designed to be either at right angles or parallel to line of sight.....page 174

Cold-chamber die-casting machine develops 40,000-lb pressures without opening of die faces with resultant flashing.....page 176

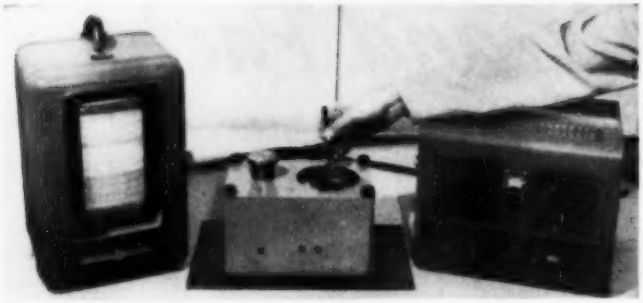
Spinning lathe has instantaneous start and stop and variable-speed adjustment .....page 176

NEW BULLETINS for your Shop Library, including a 148-page booklet giving engineering data on roller chain and its applications .....pages 191 and 192

...and in Sept 1

Cutting of jet-engine exhaust cones is being done by a special gap lathe. Flanges at both ends are machined to exact dimensions at one pass

Gaging head for use with an air gage can be used in measuring irregular parts, for checking flatness, depth checks, etc.



General Electric Torque Tester Detects Defective Ball Bearings

Designed to act as a quality-control check in both production lines and laboratory work, the tester is able to show how the torque of a small ball bearing varies as a function of the angular position during a continuous slow rotation in either direction. Bearing torque is determined by measuring the current drawn by a torque motor in counterbalancing the bearing-race torque as indicated by an electromagnetic pickup.

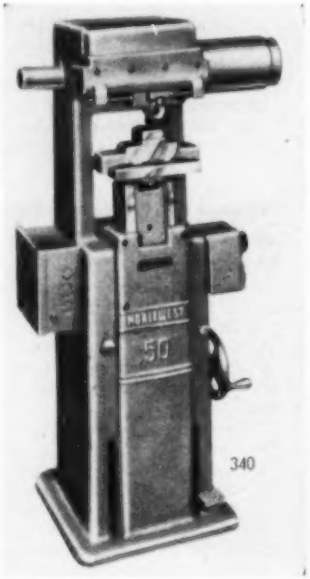
The tester is claimed to save many man-hours of assembly and disassembly by making possible the detection of dirty or defective bearings before installation in an instrument. Number and magnitude of peaks, average friction, and tendency to bind under load all can be determined.

The bearing to be tested is inserted in an adapter and both are then mounted in the tester. The inner race is clamped to the shaft of the device and the outer race is rotated one revolution in either direction by a drive motor.

Torque from the outer race is transmitted through the ball bearings to the inner race and shaft, tending to rotate the shaft assembly and angularly displace an electromagnetic pickup. A signal, proportional to this displacement, is generated in the pickup and delivered through an electronic circuit to a torque motor. The motor, in turn, generates a counterbalancing torque, and since the two forces tend to equal each other the motor current is a reliable measurement of the transmitted bearing torque.

Complete torque information is obtained in less than two minutes. The data can be either recorded on a recording milliammeter or indicated on a microrelay—a go-no-go gage. When the microrelay is used, any torque higher than a selected maximum will energize the microrelay to lock-in position and will indicate by means of a signal lamp that the selected value has been exceeded. The equipment operates on 115 v, 60 cycles.

General Electric Co, Schenectady 5, N. Y.



Automatic Roll Marker

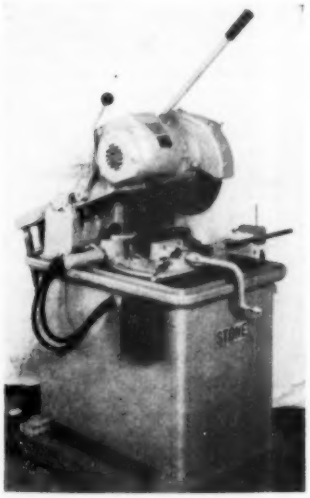
General-purpose marking machine represents a modification of the company's Model-50P1 all-pneumatic marking machine. In addition to the completely pneumatic operation, the new model features a special electro-pneumatic circuit with an electronic cycle timer which requires the operator only to load and unload piece parts. As a further step toward automaticity, the machine can be equipped with a rotary feed, air vise, or air-operated ejection unit.

The basic machine features an air-operated work table which provides marking pressure and allows compensation for dimensional variations in work. Depth of mark is controlled by air pressure preset at the pressure regulator. It also has an air-operated die slide in which the marking die is held. For single-cycle operation a master foot control is provided at the machine base. For automatic, a master switch is closed to energize the electronic timer which cycles the machine continuously.

The dual control system has the advantage that semi-automatic operation can be used for setup and for an inexperienced operator.

Each machine is equippped with a combination air - controlled unit which includes an air-line filter, pressure regulator, pressure gage, and an air-line lubricator. The filter removes foreign material and moisture from the air line and the lubricator delivers a fog of oil through the air circuit to lubricate valves and cylinders.

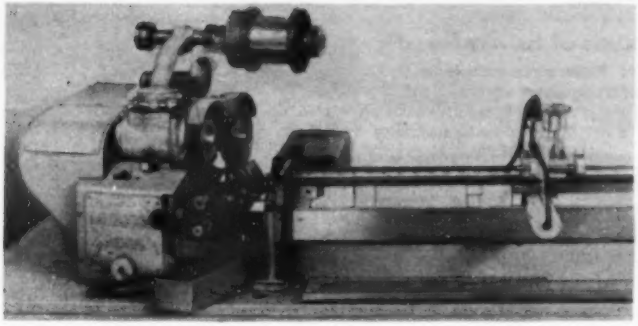
Noble & Westbrook Mfg Co, East Hartford, Conn.



Stone Cutoff Machine

The M75 cutoff machine, for both ferrous and non-ferrous metals, has increased power in the cutting head —from 5 to 7½ hp. For continuous production cutting, the work stop and air-activated vise are available at extra cost.

Stone Machinery Co, 633 Fayette St, Manlius, N. Y.



Synchronized Rolling Action of Parts Featured in Resistance-Wire Coiler

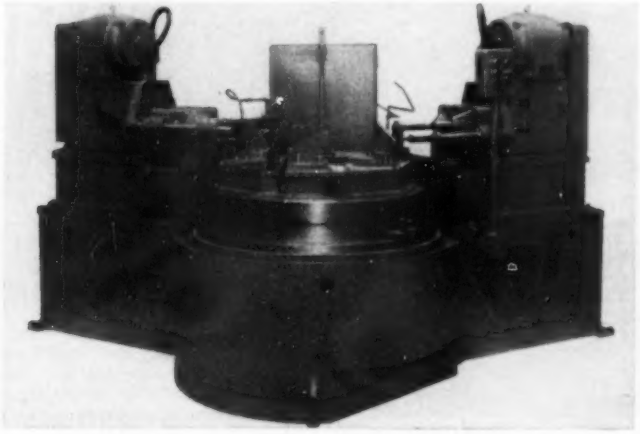
This machine enables wire of different sizes to be coiled with uniformity and without the wire being scored or misshapen. The photoelectric-cell cutting-knife control assures each coil being cut exactly to the length required. Coils produced meet resistance specifications with variation not exceeding plus or minus 1%.

The unit consists of four subassemblies: (1) coiling head—comprising the motor drive, speed control and coiling mechanism; (2) cutting knife; (3) horizontal coil-length control; (4) electronic knife control. Nos. 1 and 4 are self-contained, individual units which can be placed in whatever position is most convenient for a given working location. Thus installation is extremely easy and the units can be moved in relation to each other in order to adapt the machine to different kind of wire or coiling.

The coiler handles the full range of resistance-wire coiling normally required, close or open winding, and can be adapted for twin-wire coiling. It is said to produce coils that stretch evenly and to cut coil ends clean on all sizes, close or open wound.

Standard model coils Nos. 20 to 36 B&S gage wire. Units for other gages can be supplied to order.

Driver-Harris Co, Harrison, N. J.



SPECIAL 40-IN. INDEX MACHINE does multiple-spindle drilling and tapping operations on a tank manifold part. It consists of two No. 2 Avey automatic feed units mounted horizontally and at suitable positions on a 40-in. index table. Three workholding fixtures, complete with locating inserts, are on the table in correct relations to the drilling and tapping units—*The Avey Drilling Machine Co, Inc, Cincinnati 1, Ohio*

Roura Drop-Bottom Container

These drop-bottom containers operate with a positive counterweight handle that opens easily. The drop bottom permits gravity flow to bring parts directly to the operator's work point. There are no corrugations on the sides to catch parts and prevent the bottom from dropping.

The containers can be stacked to save floor space and stacking strips are welded at four points on the top to allow loops for overhead lifting equipment. Sides are 12-gage, reinforced with 2-in. channels and welded throughout. The drop bottom opening is 13 in. high x 31½ in. wide. In the box shown, capacity is ¾ yd, and weight is approximately 400 lb. Other sizes can be built to meet requirements.

Roura Iron Works, Inc, 1401 Woodland Ave, Detroit 11, Mich.

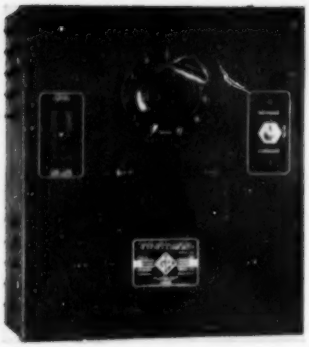
Spring-Centered Neutral Model Added to Air Control Valves

In neutral position all ports are blocked on this spring-centered air control valve. Open neutral position may be furnished on request.

Either three- or four-way piped exhaust is available in sizes of ¼, ⅜, ½, ¾, and 1 in. Styles are: Knob, lever, foot, clevis, double-acting cylinder and double-acting cylinder with solenoid pilot valves.

The medium control can be air, water, oil, or inert gases. Pressures range up to 300 psi. Principal application of the valve is to stop and hold single- or double-acting cylinders in any position. Construction of the valve is as follows: Bronze body; stainless-steel stem, hard chrome plated; Hycar "O" ring packers, brass spacers, cadmium-plated springs.

Valvair Corp, 985 Beardsley Ave, Akron 11, Ohio



¾-HP-Motor Speed Control

This control is designed for light production work where a ¾-hp motor is used; warm-up time is eliminated because electronic tubes are not used. Instant starting and reversing are provided, together with strong dynamic braking.

It is said to be especially applicable to lathes, where several operations are done on the same piece at different optimum speeds, or for operations such as blind tapping, where gradual starting and stopping is desired.

Construction and circuit are similar to that used in earlier, smaller controls. A single, relatively small unit, in addition to the motor, contains all parts, and is arranged for simple installation.

1702-A Variac R speed control is priced at $230, less motor.

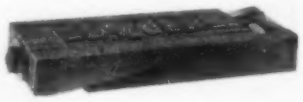
General Radio Co, 275 Massachusetts Ave, Cambridge 39, Mass.

Flat Wafer Motor Designed for Easy Mounting

This Wafer motor features an unusually short over-all length and is designed for applications requiring a totally enclosed, air-cooled unit with a flat design. It is available in ratings from 1/20th through 5 hp, and in speeds from 450 to 3600 rpm, single phase or polyphase.

Frame permits mounting by means of "ears," drilled and tapped holes in endbells, or by any special requirement of the user; it can be mounted in any position, shaft up or down, and fan can be connected directly to the motor's output shaft, eliminating pulleys, belts, brackets, and fan shaft.

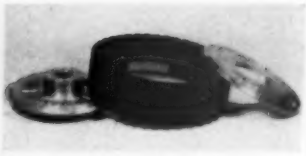
Reuland Electric Co, Alhambra, Calif.



Heavy Machinery Leveler

This device, called Lev-ler, is said to assure easy, accurate leveling of heavy machinery. Available in 6-in. size with lifting capacity of approximately 3 tons, and 8-in. size with 5-ton lifting capacity, it is self-locking under load. Leveling can be done in less than half the time normally required with shims and wedges.

Filter & Injector Co, 1001 S Broadway, Springfield, Mo.



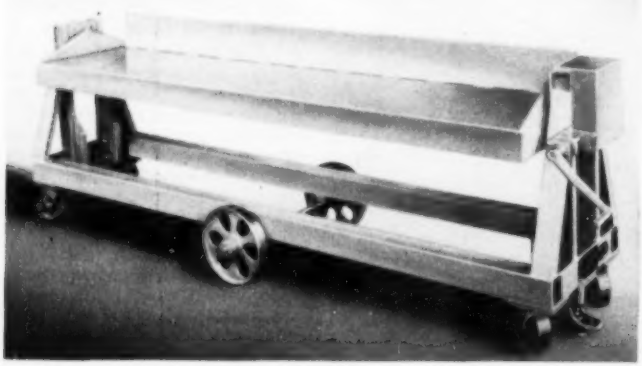
Contact Wheel Equipped With Spare Rubber Tires

The Universal T-54 contact wheel with available spare rubber tires is designed to reduce cost of wheel replacement. Complete assortment of tires with a wide variety of surfaces for different grinding operations provides maximum versatility in large and small shops.

Wheel consists of (1) a rubber tire vulcanized on a steel frame or rim for rigidity and support, and (2) a split, universal hub machined from aluminum. Two sides of the hub are joined together by four Allen screws, locking the tire in place.

Tires are available in standard face widths of 1-in. to 6-in., with fractional widths on special order; durometers range from 10 to 90 in either plain surfaces or a variety of slot designs for the particular grinding operation.

Chicago Rubber Co, 2620 Clybourn Ave, Chicago, Ill.



TILT-TOP TRUCK positions 2000-lb broach holders to facilitate maintenance operations. The table top, 24x96 in., rotates 360° on a horizontal axis and can be locked in place wherever stopped. A back plate supports broach holders and fixtures as the table tilts the work to convenient position for service. The truck rides on two wheels and four casters for easy maneuverability in restricted space. Floor locks at each end prevent unwanted movement. Capacity is 3000 lb.—*The Hamilton Tool Co, Hamilton, Ohio.*

Two-Stage Filter Unit Cleans Machine-Tool Hydraulic Oil

Portable unit consists of a Yale & Towne pump, a Cuno Auto-Klean metal-edged filter in the first stage and a second-stage filter (Cuno Micro-Klean) which filters out everything to 25 microns in size.

All the tubing and Parker fittings are to JIC standard and 1½-in. hose assemblies provide quick assembly to the tanks. Circulation rate is 10 gpm.

J. N. Fauver Co, Inc, 49 West Hancock Ave, Detroit 1, Mich.

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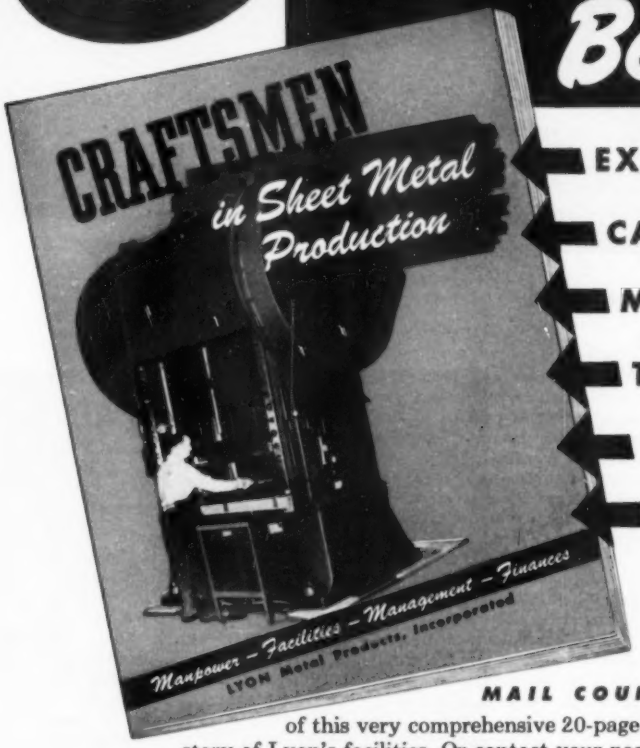

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Grinder Has Wheel Recessed In Table Work Surface

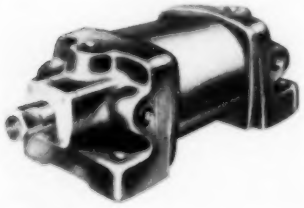
Unusual grinding principle employed in this PDQ surface grinder consists of a 12-in.-dia cylinder grinding wheel mounted in a vertical plane and recessed within the actual work surface of the grinding table. This permits finishing of surfaces as wide as 9½ in., with no limitation as to length and height of parts.

Need for various holding fixtures or magnetic chucks is eliminated due to simplicity of operating principle employed. Exceptional speed is possible as work is simply passed across face of grinding wheel; stock removal is regulated by means of a positive feed control governing depth of cut for various classes of work.

Additional feature is the removable front section of the worktable, permitting grinding of parts with side obstructions or angular surfaces which could not ordinarily be ground on a flat-bed surface grinder. When extra-width capacity is required, entire guide fence may be raised, making it possible to grind pieces up to 12-in. width. Main drive is from a 2-hp vertical-mounted motor through multiple V-belts to a floating-spindle pulley carrier.

Accessory equipment includes a dust-removal system for dry grinding and a coolant system.

PDQ Grinder Co, 6 Manhasset Ave, Port Washington, NY.



Hydraulic and Air Cylinders

Complete line of high- and low-pressure hydraulic and air cylinders features self-adjusting rod packing and leak-proof adjustable cushions. Excel cylinders are available in all popular bores, 1½-in. to 12-in. dia, up to 48-in. strokes. High-pressure units are designed for 2000 psi, low pressure for 800 psi.

Cylinders, which can also be built to machine requirements, are available in foot, flange, trunnion, and clevis mountings.

Excel Machine & Mill Supply Co, Williamsville, NY.

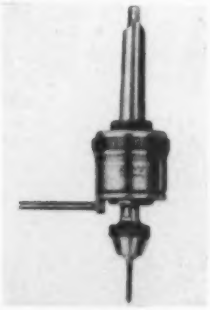
Plug-in Automatic Alarm Units

Automatic alarm units for remote signalling of failure or other-than-normal operation of valves, pumps, heaters, and many other kinds of equipment in process operations, are of unitized construction, permitting a great variety of circuit arrangements from one basic alarm unit. Unit has a switchboard circuit header wired into the basic relay in different ways, depending on circuit desired.

Hermetically sealed Tel-Alarms are self-contained, and plug into the standard chassis, which varies only in size to accommodate various multiples of the units; uniform wiring enables any circuit to be plugged into the same chassis.

Two kinds of signal lights are available: backlighted nameplates, or giant turret lenses for two-light systems.

Tigerman-Anderson Co, 4332 N Western Ave, Chicago, Ill.



Reduced Axial Stress On SPV Tapping Attachment

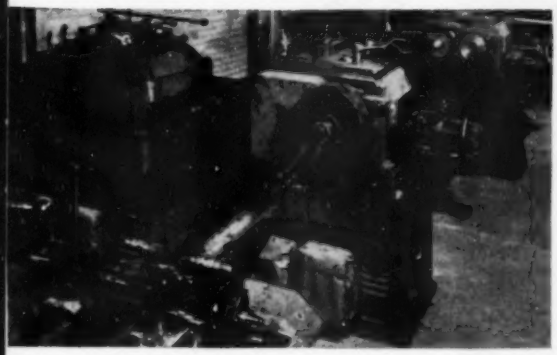
Speed of the SPV tapping attachment is limited only by durability of the tap; it is possible to machine tap holes at a cutting speed of 300 fpm, and to tap blind holes in light metal at spindle speeds up to 2500 rpm. Possibility of double-threading pre-tapped holes is eliminated because finishing tap is allowed to rotate at full speed, and on being fed into pre-tapped hole, automatically picks up thread correctly.

Torque is transmitted through a mechanical locking device comprised of steel balls and springs, unaffected by rpm variations, oil, or heat. A reversing device permits rapid reverse action through use of a specially-designed radial bearing; reversing clutch is mechanical in operation, rather than frictional.

All moving parts are carried in ball or needle bearings, the locking body in ball bearings, and the axially sliding body in needle bearings—reducing axial stress. Capacities of five models are No. 0—No. 5, No. 4 to ¼ in, No. 10 to ½ in, ½ to 1⅛ in, and 1 to 2 in.

Eric S Johnson Co, 230 E Ohio St, Chicago 11, Ill.

DEFENSE PLANT DE-MOTHBALLED FAST WITH THE HELP OF TWO SUN PRODUCTS



BEFORE: The machinery in this Navy-owned shell-making plant stood idle—coated with a rust preventive—for 5 years after World War II. When asked to reactivate the plant in three months, the U. S. Hoffman Machinery Corporation anticipated a complete machinery teardown for cleaning, because the rust preventive had seeped into the working parts.

AFTER: No teardown was needed. Sun Spirits did the external cleaning job and the detergency of Sunvis H.D. 700 Oils the internal job—cleaning out parts and freeing hydraulic systems. Thanks to the effectiveness of these products, the job was completed and the plant put in operating condition within the three months specified by the Navy.

Recently the U. S. Hoffman Machinery Corporation was asked to reopen a World War II Navy-owned shell-making plant and start production in three months. The machinery, idle for 5 years, had been protected by an external layer of rust preventive. Headstocks, gear units and hydraulic lines were among the parts coated, and unfortunately some of the protective material had seeped into them. It looked as if the machinery might have to be torn down to be cleaned.

Hoffman invited Sun and several other oil companies to survey the machinery and suggest cleaning methods. The company chose Sun's recommendations on the basis of their soundness, as well as on Sun's record for reliable service in other Hoffman plants. The Sun products used eliminated the need for any dismantling. Sun Spirits did the external cleaning job. Sunvis H.D. 700 Oils freed up the hydraulic systems, many of which were extremely sluggish; the detergency of these oils flushed away every last trace of sludge and rust preventive.

Throughout the entire cleaning and recharging process, Sun representatives stayed on the job. As part of Sun's regular service, they trained the oilers, helped work out an inventory control system, and set up lubrication schedules. The terms of the Navy contract were met, and vital defense production was started on schedule. In the year and a half that has since elapsed, there have been no machine failures traceable to poor lubrication.

SUN OIL COMPANY, Dept. AM-8
Philadelphia 3, Pa.

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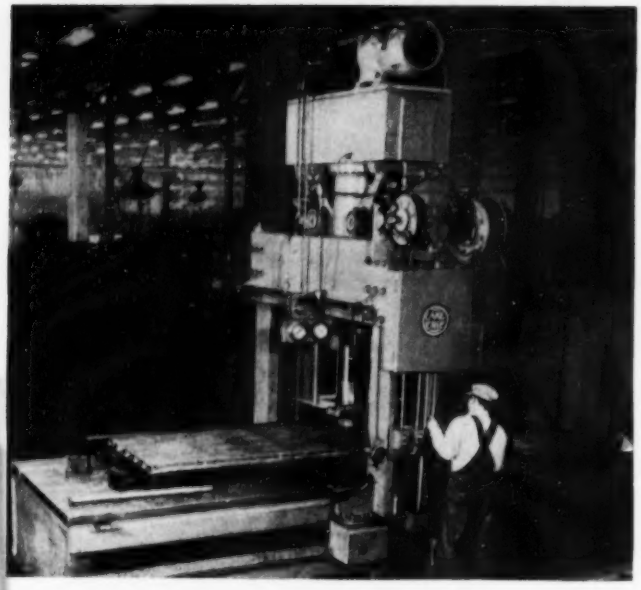


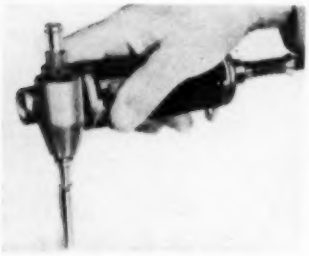
Lake Erie Straightening Press Has Two-Directional Head Travel

These presses, ranging in capacity from 200 to 2000 tons, feature optional two-speed ram travel in both longitudinal and transverse directions—thus reducing setup and operating time required for straightening work. They are available with either one or two traveling heads on the same bed frame.

Extra strength is provided by the dovetailed keys on the side frames which grip the bed in a pincer-like action during operations. Additional rigidity is provided by large horizontal keys which secure the side frames to the crosshead above the bed and to the cross-tie below it.

Other features include: use of wheels for smoother traversing action, rather than cumbersome rack and pinion; totally enclosed gearing; adjustable pressure and stroke controls; combination of pushbutton and hand-lever controls; and fast-opening surge valves which eliminate additional piping for rapid approach and return cycles of the ram.

Lake Erie Engrg Corp, Buffalo, N.Y.

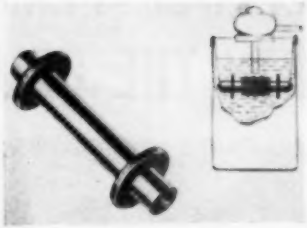


Dremel Electric Screwdriver

Operator ease is provided in these electric screwdrivers by light weight, long life, and operation at right angles to the work. Smaller Model SD-1 drives free-running screws or nuts from No. 0 to No. 4, inclusive; the larger SD-2 is for sizes No. 4 to No. 8, inclusive. Model SD-1 weighs 12 oz, is 4¾ in. long, with a driver-bit speed of 1200-1400 rpm. The SD-2 weighs 18 oz, is 6½ in. long, with a driver-bit speed of 1400-1600 rpm.

The electric screwdrivers can also be used for unscrewing by inserting a bit into the top chuck and turning it by hand. Both models are equipped with a slip clutch to assure even screw tension and eliminate stripping of threads. The driver operates on a 110 to 115 v ac or dc and is available for 220 v at no extra charge.

Dremel Mfg Co, Racine, Wis.

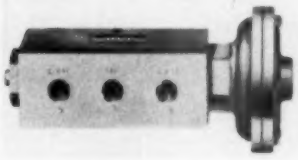


Coolant-Pump Magnet

Low-cost coolant cleaner is recommended for toolroom grinders and lathes, light production drilling, tapping, valve grinding machines, etc. It is not for heavy production grinding.

The 1⅛-in.-dia by 8-in.-long magnetic unit is suspended under the pump intake in coolant tank. It accumulates a mass of chips 4½ in. long and 1 in. thick around its entire circumference. The chips are removed simply by pushing the wiper ring to the opposite end of tube. Model 121 is $16.50 FOB Detroit.

Magnetool Div, Multifinish Mfg Co, Dept 30¼, 2114 Monroe Ave, Detroit 7, Mich.



Hunt Diaphragm Valve Operates On 12- to 35-Psi Air

This diaphragm-operated, spring-return, single-plunger valve is for use when only low-pressure air is available for pilot control. It can be operated with instrument air at pressures of from 12 to 35 psi on the diaphragm.

All parts are carefully balanced. The valve housing is aluminum and the stainless-steel plunger is hollow and has radial ports. The spring return is placed under the diaphragm push blade, permitting open-end exhaust if desired. The valves can be completely disassembled and reassembled in a few minutes without disturbing the main piping.

They are furnished tapped for either ⅛- or ¼-in. pipe connection, in 2-way; 3-way, double 2-way; 4-way, and 5-way designs for use with air, oil, or water at line pressures up to 125 psi. or vacuum. Temperatures should not exceed 150 F.

C. B. Hunt & Son, Inc, Salem, Ohio.

The only rectifier welder designed to eliminate stack failure!

A.O.SMITH D.C. WELDER

Sectional view of the new A. O. Smith Rectifier-type D.C. Welder and diagrammatic drawing show ideal location of stacks and circulation of high-velocity air through the welder.

Available in 200-, 300-, and 400-amp. models.

Location of rectifier stacks in the flow of cool, clean air entering the top of the A. O. Smith D.C. Welder assures positive cooling of these most critical parts.

Wind tunnel design, proved for more than a decade in A. O. Smith Heavy Duty Welders, blasts cool air down and over rectifier stacks. This prevents stack failure. In addition, clean rectifier stacks and clean glass-insulated heavy copper transformer coils are assured. Maintenance down-time is thus avoided.

This marked advance over conventional rectifier-type welders solves overheating problems, ends limitations on duty, avoids introduction of floor dirt and eliminates rectifier stack failure.

Other refinements provide effortless amperage control, universal application and economical operation. They, too, are exclusive in this advanced design, rectifier-type, D.C. Welder.

A.O.Smith
WELDING PRODUCTS

Made by Welders . . . for Welders

For complete information, write direct to: **A. O. Smith Corporation, Welding Products Division, Dept. AM-852, Milwaukee 1, Wisconsin**

Wales-Strippit Boring Machine

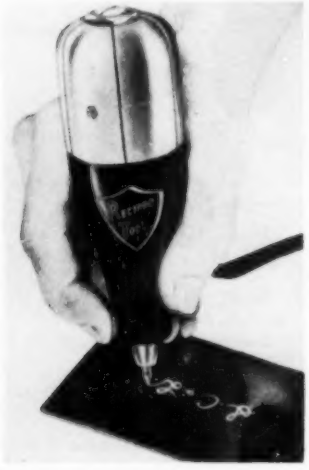
This machine is equipped with a heavy-duty boring head and tooling that permits the boring of holes up to 5 in. in diameter. Known as the DeLuxe Model, it also combines simplicity of operation and easier locating in the layout drilling and reaming of holes in material of practically any length up to 36 in. wide.

The head is equipped with an adjustable guide support that is moved down close to the top of the work for accuracy during drilling and reaming. Extra large bearing area on head assembly base assures travel at exactly 90° on two accurately ground ways across the solid bridge.

The work is securely clamped to the long slide rail which moves in the ways to locate the work under the head. Easier movement of the work is provided by anti-friction ball inserts located over the entire table area.

For more information see *AM*, June 11, '51, P. 192.

Wales-Strippit Corp, 345 Payne Ave, North Tonawanda, N. Y.



Reciprocating Hand Marking Tool Delivers 5¼-Lb Impact

The Recipro Tool will engrave letters, numbers, or identification marks on any material of any hardness, size, or surface finish. It can also be used for riveting, filing, burring, peening, for cutting plastics, shim stock, etc.

It delivers 5¼-lb impact and is available with a variety of hardened alloy-steel bits, (for materials up to RC 50) or with diamond-tipped bit.

It reciprocates at 7200 power strokes per minute and is adjustable from 0 to ⅛ in. length of stroke.

Low center of gravity, finger grip close to chuck, finger-tip switch control, and electric cord leading under operator's hand means easier operation with less operator fatigue.

S. C. & L. Machine Co, 1121 Fourth Ave, Rockford, Ill.

Safety goggle, featuring a transparent plastic frame which provides a wide field of vision, can be worn directly over the eyes or over spectacles. It is particularly useful for frontal protection against foreign particles on machine and hand tool work, spot welding, and light grinding, chipping, and riveting.

American Optical Co, Southbridge, Mass.

Circular-Saw Sharpener

Designed for wide-tooth-spaced saws, the Easy Cut sharpener generates the correct tooth shape with uniform, sharp teeth.

Features include: cam action, generation of the proper tooth length and shape, capacity for saws from 6 to 24 in. in dia and special ½-hp.-capacity motors. The feed finger is spring actuated and adjustment for saw hook is provided from 0 to 30°. Saw bushings in sizes from ¼ to 2-in. dia are included, together with the Red Anchor grinding wheel and wheel guard.

Hanchett Manufacturing Co, Big Rapids, Mich.

Plastic-Dot Work Glove Outwears Plain Canton Flannel

U. S. Testing Co reports show that Plastic-Dot fabric outlasted 10-oz canton flannel fabric by over two-to-one. The Plastic-Dot gloves will cost only slightly more than ordinary 10-oz canton flannel gloves. In addition, the gloves still retain all the lightness, flexibility and comfort found in the regular gloves.

Regal Textile Corp, P O Box 170, Grand Central Station, New York 17, N. Y.

Deep drilling aluminum is easy when you follow ALCOA'S recommendations

Deep drilling can be done in any of the standard Alcoa Screw Machine Alloys. They combine a wide range of properties—strength, corrosion resistance, finishability. But if deep drilling is most important, choose 17S-T4.

Use straight fluted drills for average depth holes. Use either slow or high spiral drills in 24S-T4 and 61S-T6. All three drills have wide flutes that readily pass up the chips. For very deep holes use a standard drill to a depth of about 3 diameters, then follow with a half-round drill.

You'll increase drill life and reduce heat by thinning the margins along the edges of the drill flutes. As the drill is ground back, the web should be thinned at the point. In deep hole drilling the included angle should be larger than the standard 118°. This produces a narrower chip that clears easily. When several drills are used, each succeeding drill should have a larger included angle.

Your local Alcoa sales engineer will answer your questions on machining, alloy selection and finishing. You'll find him listed under "Aluminum" in your classified phone book.

ALUMINUM COMPANY OF AMERICA
871H Gulf Building • Pittsburgh 19, Pa.

TWO FREE BOOKS

"Alcoa Aluminum in Automatic Screw Machines"—a 95-page book containing information on tool design, setup and operating techniques.

"Corrected Tool Diameter Tables"—a 64-page book giving corrected tool diameters for circular form tools and flat form tools under conditions of 0°, 5° and 10° top rake.

ALCOA TELEVISION — CBS Network, 6:30 to 7:00 P.M. EDST every Sunday on most stations — 8:30 to 9:00 P.M. in far West

ALCOA

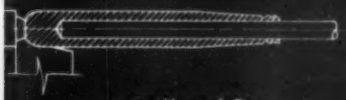
ALUMINUM SCREW MACHINE STOCK

Box and Center

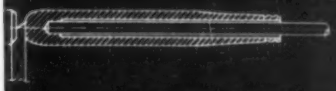
Drill and Support

Support and Form

Thread



Drill and Form



Drill and Cutoff

Molded V-Belt Sheaves

Line of V-belt sheaves are molded from Compolete, a fibrous material which is molded to close tolerances under high pressure. It possesses an extra-hard wearing surface that is unaffected by moisture, oil, temperature, etc. In addition, it cannot rust or corrode.

The sheaves are stocked in sizes from 2 to 6 in. OD, in graduations of ½ in. Bore sizes are ½, ⅝, and ¾ in., with or without keyways. Total width is 1 7/16 in. Allen set screws are furnished.

W C Products, Inc, 1748 Berkeley St, Santa Monica, Calif.

After cooler cools compressed air or gases by the evaporation of recirculating water sprays on the surface of tubes through which the compressed air passes. Increased capacity in the new models is gained by improved distribution of the compressed air in the machine and an increase in the amount of evaporating surface. Tube sizes have been increased to reduce friction. The cooling medium is air at the atmospherical wet-bulb temperature of surface cooling water.

Niagara Blower Co, 405 Lexington Ave, New York 17, NY.

Writing slide rule writes in a choice of two colors and also magnifies. Among the ten functions which are combined in one instrument are telescoping measuring scale, a reading magnifier, a depth gage in in. and cm, a detachable straight edge, concealed eraser and spare pencil leads, a plain and enlarging indicator for the slide rule's A, B, C, D, L, S, T, CM, and IN scales, and a pocket-clip. The device is 6½ in. long, weighs only 0.8 oz and comfortably fits the hand.

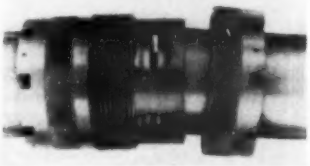
The Device Development Co, 226 W 4th St, New York 14, NY.

Dies Snapped in Place on Hand Mitering Tool

Various dies are available for this hand mitering tool, made of hardened-and-ground tool steel. Mitering, notching, slotting of unhardened steel up to 1/32 in., and metals like copper and aluminum up to 1/16 in., can be done with this tool.

Dies are snapped in place, making them easily interchangeable. Weight of tool is only 2 lb assembled.

Lander & Abbott, La Crescenta, Calif.



Flexible Coupling Withstands Pressures of Over 375 Psi

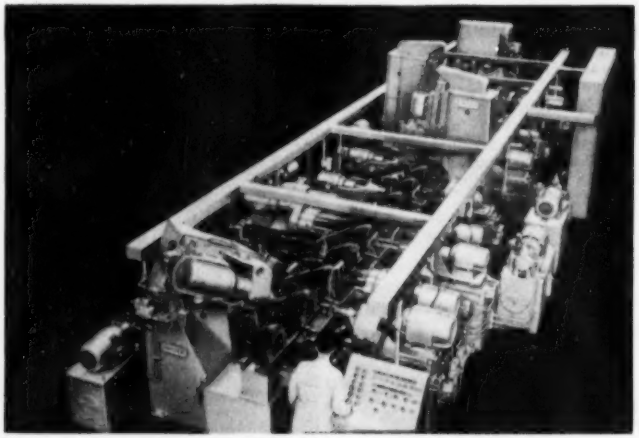
Pressures in excess of 375 psi and temperatures from –65 to 460 F can be withstood by this flexible coupling.

The coupling may be misaligned as much as 3° without leaking and tube ends may be separated as much as ½ in. without affecting sealing. End load is absorbed with a metallic retainer. Standard AF 934 "O" rings are used. It is light weight and can be installed after tubes are in place without making large cutouts.

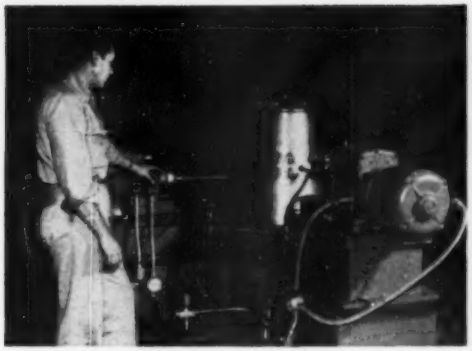
E B Wiggins Oil Tool Co, Inc, 3424 East Olympic Blvd, Los Angeles 23, Calif.

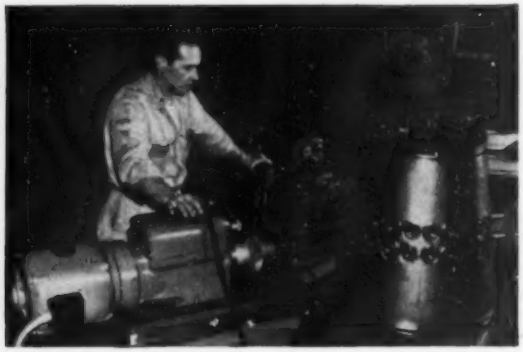
Bolt cutter has reversible cutting blades. This feature is claimed to double blade life automatically with little increase in cost. Known as the Model 30-MCC, it has forged steel handles. Jaws and handles, by pair, are interchangeable with standard 30-in. cutters.

Manco Mfg Co, Bradley, Ill.



22-STATION TRANSFER MACHINE does drilling, rough and finish boring, milling, sawing, tapping, spotfacing, counterboring, and chamfering—a total of 37 operations on 105 surfaces or holes of various dimensions. The work is a cast-iron clutch housing with a production rate of 124 cycles an hr at 80% efficiency. At Station 1, a 2-in.-dia breather hole is trepanned from the solid casting and finish bored with one tool. At Stations 8 and 9 normal positioning of milling cutters and transfer rails would have resulted in interference. The problem was solved by dropping a section of the rails through cam action linked to the milling units. At Station 16, the workpiece is turned 90° and transferred to another set of rails without being permitted to vibrate or move out of correct location during the movement. — *Snyder Tool & Engineering Co, 3400 E Lafayette, Detroit 7, Mich.*





"How We Boosted Production With A Special Machine Built Around DELTA DRILL UNITS"

DIFFICULT STAINLESS STEEL DRILLING OPERATIONS PERFORMED SEMI-AUTOMATICALLY

Says J. A. LOGAN, Chief Production Engineer, Solar Aircraft Co., San Diego, California

"With machine tools hard to get, and skilled manpower in dwindling supply, we are always on the alert to develop unitized tools that perform multiple operations semi-automatically and with minimum attention. One recent problem was solved by Delta Air Powered Hydraulic Drill Units.

"This unitized tool bores exhaust cones for jet engines. Two Delta Drill Units are set 90° apart, pointed to the rotary table which is full indexing. With push-button operation, cycling is automatic. Two holes are drilled at once."

"Results were important—

- **sharply increased production**
- **release of a radial drill press for other duty**
- **set-up time, a serious item with the drill press owing to the shape of the cone, practically eliminated."**

ONLY THE DELTA AIR POWERED HYDRAULIC DRILL UNIT HAS ALL THESE FEATURES:

Hydraulic Feed . . . quickly adjusted, infinitely variable—no recamming or changing lead screws to alter feed.

Rapid Traverse . . . positive stop, quick, accurate control—no over-travel; reduces tool breakage. Approach consistently at 5 to 6 inches per second to within .010 inch of work.

Depth Control . . . positive stop, quick, accurate—no over-travel; repeats depth consistently to within .0005 inch.

Universal Mounting . . . units can mount in any position.

Automatic Cycling . . . built-in cycle control switches provide for full electrical remote control. Eliminates installing external switches. Drilling units positively electrically interlocked with automatic indexing table.

Special Spindles . . . drive arrangements and other features are available at slight additional cost, including new two-way valve to permit spindle to function with normal rapid retraction or to back feed, as desired.

Three Sizes—capacities up to 5/16-inch diameter drill, 1½-inch stroke; ½-inch diameter drill, 4-inch stroke; and 1-inch diameter drill, 6-inch stroke.

Another Rockwell Product

There's a Delta Power Tool for Your Job-

WOOD OR METAL WORKING

53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

MILWAUKEE

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☐ Please send the name of the nearest Delta Drill Unit Authorized Representative.

☐ Please send me new Drill Unit Catalog.

Name _____

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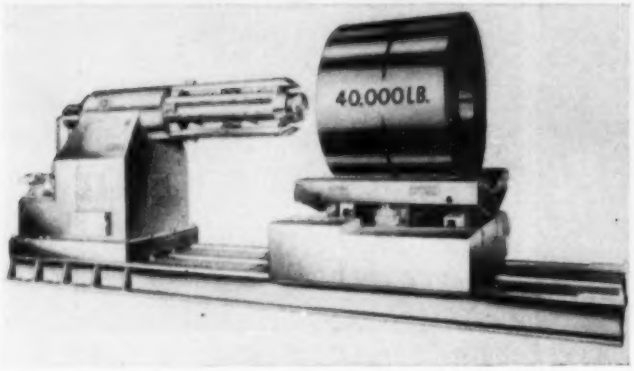


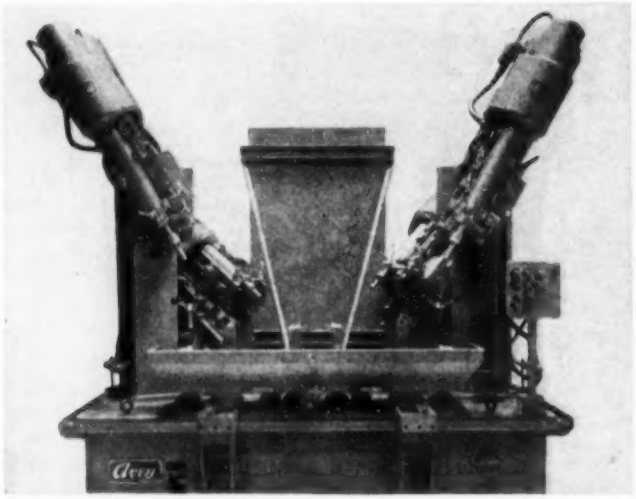
Automatic Centering Reels Have Hydraulically Expanded Arms

These reels have arms which are contracted by means of hydraulically actuated cams within the spindle. As the spindle sleeve is hydraulically pushed forward, the arms contract to the minimum diameter. As the sleeve is pulled toward the frame, the arms spread until the coil is gripped tightly. The cams on the sleeve and on the arms are mechanically interlocked to hold the arms in proper position. Because the arms are simultaneously expanded, the coil is accurately centered.

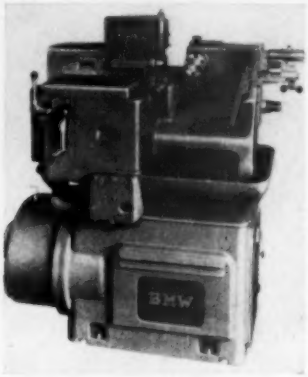
The V-type coil-loading car rides on a track base which can be extended from machine to coil storage area. The material can then be conveyed to the reel without intermediate handling.

The reels are available in 5-, 10- and 20-ton capacities.

F J Littell Machine Co, 4105 Ravenswood Ave, Chicago 13, Ill.



DEEP-HOLE DRILLING MACHINES consist of four No. 1 Aveydraulic Torquematic drilling units having 12-in. ram travel with remote start to drill all twelve ¼-in. holes in a tank crankshaft. The drilling units are mounted at suitable angles on a fabricated steel base. Machine has built-in hydraulic power source and is made to J.I.C. electrical standards. The cranks were steel forgings and production is estimated at approximately five to seven pieces per hr. — *The Avey Drilling Machine Co, Inc, Cincinnati 1, Ohio*



Interchangeable Cam Units On Automatic Screw Machine

Interchangeable cam assembly units that can be pre-selected and assembled for the next job, while one lot is still being run, reduce setup and downtime on German-built B M W single-spindle automatic screw machines.

The assembly unit not only includes cams for the longitudinal feed of the turret, front and rear cross slides, turret index, collet actuation, and stock feeding, but also, as standard equipment, trips dogs to change rotation of the work spindle. Both cams and trip-dog disks are divided into 100 graduations and the drive rings are designed with 100 serrations to permit rapid and correct settings.

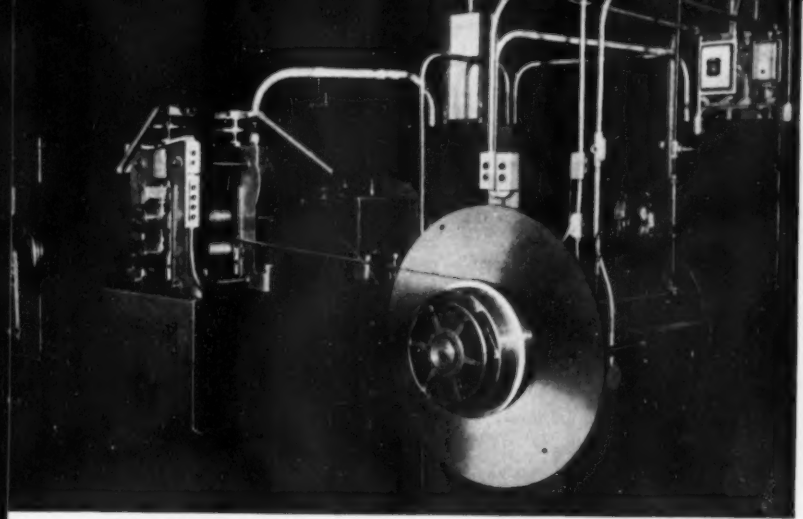
The short, rigid work spindle is mounted in anti-friction bearings, belt driven between bearings, and can be run up to 5800 rpm. The six-hole turret and the three cross-slides are rigidly constructed and their guide ways are protected by chip guards. All slides have micrometer adjustment. Collets and cams are interchangeable with American-built equipment.

The driving mechanism and the cams are completely enclosed and separated from the tool and chip area, but are readily accessible through detachable guards. The hand-feed crank is automatically disengaged by a safety interlock when power feed is used.

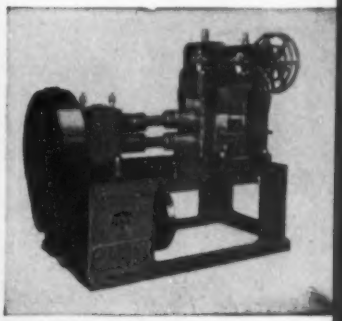
The stock feed mechanism is automatically disengaged when the end of the bar is reached.

Bar capacity is ⅞ in. OD, with a maximum turning length of 1¾ in. Attachments are available for drilling, cross drilling, recess boring, and slotting. Imported by:

Kurt Orban Co, Inc, 205 E 42nd St, New York 17, N. Y.



THIS FENN COMBINATION, consisting of the new No. 061 Two-High Roller Bearing Rolling Mill and No. 30 Take-Up Reel, installed at Federal-Mogul's St. Johns, Michigan Plant . . .



GREATER ACCURACY of the new No. 061 Two-High Rolling Mill comes from heavier roll construction made possible by Fenn-designed extra-heavy precision roller bearings. Roller thrust bearings on outer bearing boxes maintain axial alignment, eliminating marks or "shadows" on the stock. Universal joint and herringbone gears provide smoother drive from motor through to rolls, for smoother finish of strip.

Reduces Inventory...Saves Maintenance

...CUTS COSTS

Federal-Mogul is one of the growing number of forward-looking firms that are making sure of an adequate supply of top-quality strip by "rolling their own."

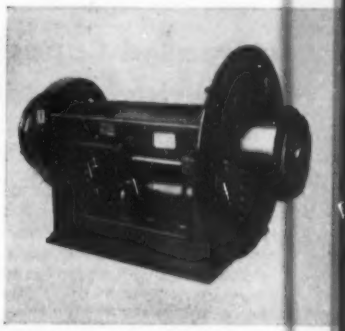
This way, they roll one stock thickness to meet many needs, thus reducing stock inventory . . . the more accurate strip they produce speeds production and saves maintenance on fabricating machines . . . and there's further economy in eliminating such "mill extras" as set-up, inspection and short run lots.

To get these benefits at their fullest, Fenn units are the obvious choice. The installation shown above, for example, is one of many typical Fenn combinations for the production of ferrous or non-ferrous strip—at top speed and lowest cost.

GET THE WHOLE STORY

Fenn Roller Bearing Rolling Mills are available in Two-High and Four-High models, with roll diameters from 4" to 16", single or tandem units, speeds up to 2,000 ft. per min. Fenn Take-Up Reels are made in a range of sizes for either traversing or "pancake" winds. For full information about their many cost-saving, efficiency-boosting advantages, contact your nearest Fenn Distributor, or write direct to

THE FENN MANUFACTURING COMPANY
1859 Broad St., Hartford 1, Connecticut



FASTER REMOVAL of finished coil is one big advantage of Fenn's No. 30 Take-Up Reel — resulting from such design-improvements as collapsing drum and hydraulic stripper. Having a capacity of 3,000 lbs. of coil, while providing a tension of 2,500 lbs., it combines with the Fenn Mills to handle up to 2,000 ft. of strip per min.

FENN

Forming metal for better and stronger products at lower cost

FENN MACHINES ARE SOLD BY:

ATLANTA
J. R. Wolraven
BALTIMORE
Refer: Calco Mach'y Co., Phila.
BIRMINGHAM
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SEATTLE
Star Machinery Co.
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Syracuse Supply Co.
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TORONTO, WINDSOR
Williams & Wilson Ltd
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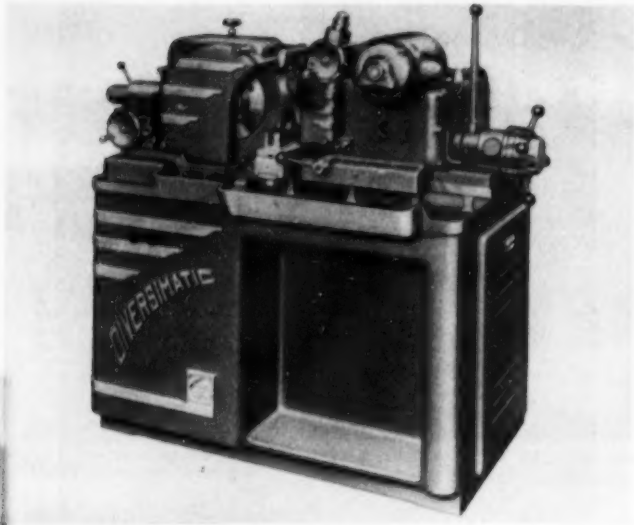
Indianapolis Machinery Export Co., Inc., New York, N. Y.



Increased Capacity on Centerless Grinding Machine

The Diversimatic No. 1 centerless grinder has been superseded by the No. 1-R, a machine of greater capacity and superior design. Stock diameters can now range from 0 to 1½ in. Due to increased ruggedness and capacity, the machine is recommended for operation with 5-hp motor only.

A complete line of accessories is now available for any centerless-grinding operation, including: automatic air-operated stock ejectors, outboard roller-support attachments, toggle-cam devices to provide greater width of opening between wheels, and an automatic cycling attachment for in-feed grinding. When this last attachment is used in conjunction with a hopper feed the Diversimatic becomes entirely automatic.

Because of a massive grinding-wheel spindle supported by roller and ball bearings, it is claimed that the spindle does not require a pre-operating warm-up in order to hold size tolerances.

Diversified Metal Products Co, 5125 Alcoa Ave, P O Box 362, Los Angeles 58, Calif.

Magnification	30x
Range	10 in. to infinity
Field	31.4 at 100 ft.
Resolution	2 seconds of arc
Over-all length	18 in.

Scope for Optical Tooling Has Spherical Mounting Ball

Optical tooling is a system for accurately locating the positions of fixtures on a jig frame. The fixtures then act as guides in the building of aircraft components.

A basic line of sight is established between the ends of the jig and the auxiliary lines are established parallel to it, using high powered telescopes and targets. The Align-A-Scope, described here, is one of these. In-between positions along this line of sight are established by means of other targets. Angular locations are found by using an optical square in the line of sight to position additional targets. Squaring up a target in relation to the line of sight is done by means of auto-reflection. The reflection doubles the angle of error, allowing a perpendicular setting to be made with greater accuracy.

Once the jig is built the system is also used to accurately assemble the parts in the jig during production.

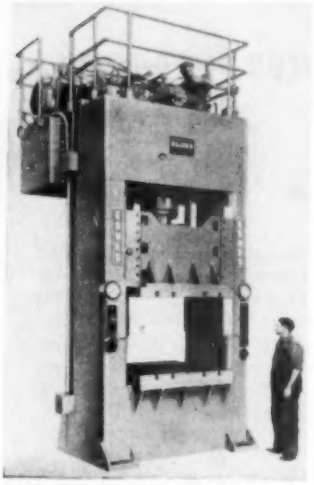
Features of the Align-A-Scope include:

(1) Eyepiece designed to be positioned either parallel to line of sight or at right angles to it. It can be quickly shifted to either position, enabling the scope to be used in hard-to-reach locations. In the right-angle position, the eyepiece can be rotated a full 360°.

(2) The optical micrometer incorporated in the unit displaces the line of sight either vertically or laterally. Operating valves control and indicate the amount of displacement within 0.001 in.

(3) A 3½-in.-dia spherical steel mounting ball is integral and concentric with the barrel of the scope. The barrel is hardened, rustproof, chrome alloy, steel-ground and lapped to the AIA and NAS standard of 2¼ in. diameter.

Joel Fox Co, Inc, 1110 N Seward St, Los Angeles 38, Calif.

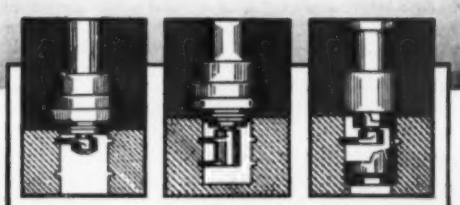


300-TON HYDRAULIC PRESS designed for the making of plow beams has a special hydraulic circuit with two pressure cycles in one. Operation is by remote electrical control with two foot switches. The ram exerts a low tonnage by activating one foot switch, and a high tonnage by activating the other. The plow beams are bent to a specific angle at low tonnage and then turned for flattening at the high tonnage. A simple crank handle for operation of limit-switch control is located at the left, and inching-down handwheel at the right. The operator can inch-down the platen as little as 1/16 in. at a time. The thermostat in the reservoir automatically stops the press if the oil should reach a critical temperature. *American Steel Foundries, Elmes Engineering Div, 1150 Tennessee Ave, Cincinnati 29.*

Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves in bores and housings

FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for Catalog giving mechanical details, cutting sizes...extra features...full information

WALDES

TRUARC

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GROOVING TOOL

WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place
Long Island City 1, New York AM-044

Please send me complete information on Waldes Truarc Internal Grooving Tool.

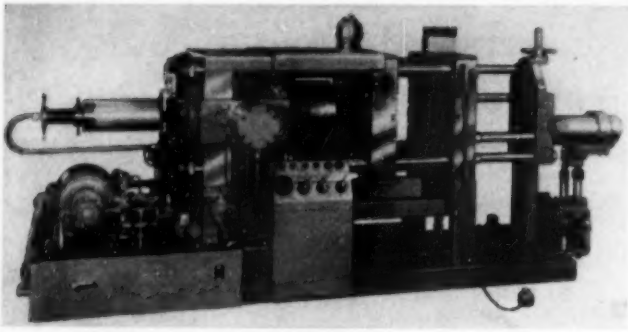
Name_____

Title_____

Company_____

Business Address_____

City_____ **Zone**____ **State**_____



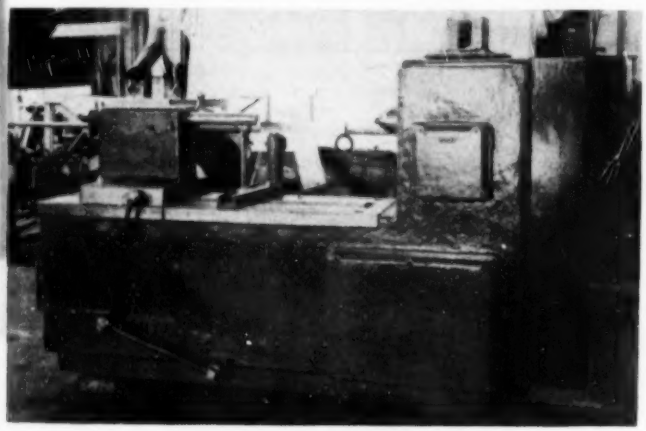
Cold-Chamber Die Caster Develops 40,000-lb Pressure

Wedgelock, a cold-chamber die-casting machine, develops and holds 40,000-lb pressures without opening of die faces and flashing. Dies with 7½-in.-deep cavities can be run with an opening up to 15 in. maximum. The shallow cavity can be run at a 10-in. opening for faster cycling and increased output. Any opening can be set between these two points.

A motorized central screw adjustment regulating die height makes possible adjustments to 0.001 in. The Wedgelock construction eliminates toggle links, with direct locking prolonging die life.

The pump delivering oil to the shot cylinder has an adjustable relief valve permitting pressure from 1000 to 2000 psi. A central hydraulic ejector cylinder eliminates manual rack-and-pin ejection.

Cuyahoga Industries, 17920 Waterloo Road, Cleveland 19, Ohio.



Instantaneous Start and Stop On Ferracute Spinning Lathe

Distance between face plate and tail stock	44 in.
Maximum swing over bed	24 in.
Spindle bearing	Timken
Infinite speed range	200 to 1000 rpm
Standard rest	pin type

The Model 224 spinning lathe saves production time in such standard operations as spinning, buffing, burnishing, trimming, wiring, and beading. Movements made by the operator are simpler and faster than in conventional practice and less effort is required.

A 5-hp motor is used as standard, providing ample power for high-speed starting and in mantaining proper work speed. The motor has two speeds, selected by pushbutton on the motor control panel. By use of a variable-speed adjustment, the low motor speed permits infinite selection between 200 and 500 rpm. The high motor speed is infinitely adjustable between 400 and 1000 rpm.

To employ any speed between the two speed ranges, the operator rotates the speed adjusting handwheel, located at the left. Speed, indicated by a graduated gage, may be varied while the lathe is running.

The transmission is set at the desired working speed while the motor is running, but before the headstock spindle is started. A pull of the control lever engages a dry-disk clutch and the spindle immediately comes up to speed. Moving the control lever to the left, in an arc of only 45°, engages a cone brake to bring the spindle to rest instantaneously. Once applied, the brake remains on until released by the operator.

Air is employed to move the tailstock spindle quickly and easily. One spindle-operating lever, conveniently located for righthand control, is moved toward the work and the spindle travels forward. Further movement in the same direction locks the spindle firmly. Movement of the lever away from the work unclamps the spindle and causes it to withdraw. Maximum travel is 12 in., and it can be set to any length within this range. Speed of positioning spindle is readily adjusted by means of a control valve. Spindle has a ¾-in. bore and standard No. 3 Morse taper. The tailstock casting is easily moved and firmly clamped at any desired position on the bed. Use of a tapered headstock spindle with a corresponding taper in the face plate offers a firm, true-center mounting. The two members are keyed and held in place by a spanner nut. The headstock spindle is hollow with a ⅝-in. bore and has a standard No. 3 Morse taper.

Ferracute Machine Co, Bridgeton, N. J.

Concrete Floor Hardener No. 860 is reported to change the chemical structure of concrete, forming a dense, non-porous, flint-like surface which retards dusting and rusting, even under the heaviest traffic. A clear, colorless liquid, it is easily applied by brush or mop. It is said to lower cleaning cost, and to resist water, oil and acid.

The Monroe Co, Inc, 10703 Quebec Ave, Cleveland 6, Ohio.

To operate at spot welding forces up to 6000 pounds

New Mallory "*Premium*" 8° Heavy Duty Electrode Holders

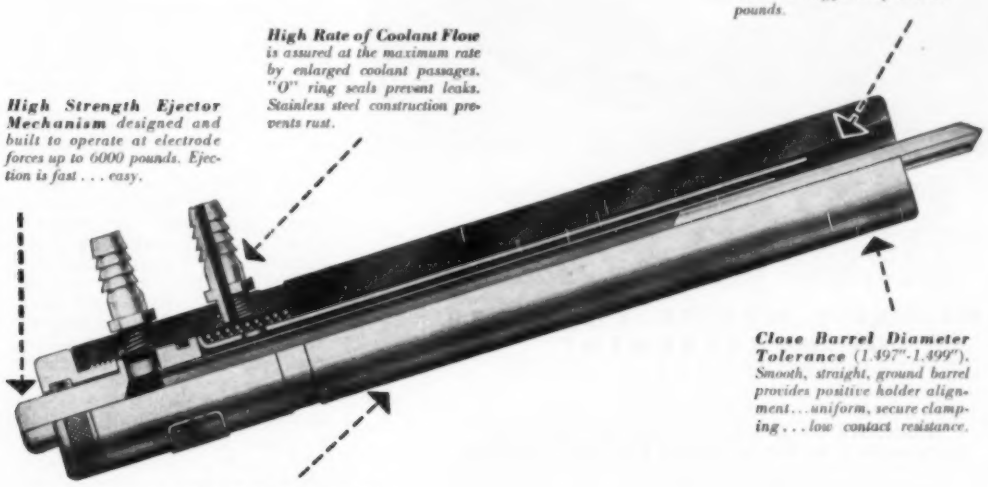
Latest addition to the widely-used Mallory line of leak-proof electrode holders, the new "Premium" heavy duty holders are designed to help you handle the higher electrode forces and welding currents required to meet the rigid specifications on military components.

Consider the special "Premium" features which help you get economical, dependable welding performance . . .

Easy Electrode Removal *is made possible—without lubrication—by the 8° taper of the electrode socket (4° per side) even at seating forces up to 6000 pounds.*

High Rate of Coolant Flow *is assured at the maximum rate by enlarged coolant passages. "O" ring seals prevent leaks. Stainless steel construction prevents rust.*

High Strength Ejector Mechanism *designed and built to operate at electrode forces up to 6000 pounds. Ejection is fast . . . easy.*



Close Barrel Diameter Tolerance *(1.497"-1.499"). Smooth, straight, ground barrel provides positive holder alignment . . . uniform, secure clamping . . . low contact resistance.*

Nickel Plated Barrel *protects against abrasion and corrosion with a pure, high quality nickel plating.*

Standard Mallory Fluted* Electrodes with 8° taper (4° per side) are available in a variety of sizes, shapes and alloys for use with "Premium" holders.

*Patent Pending

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For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

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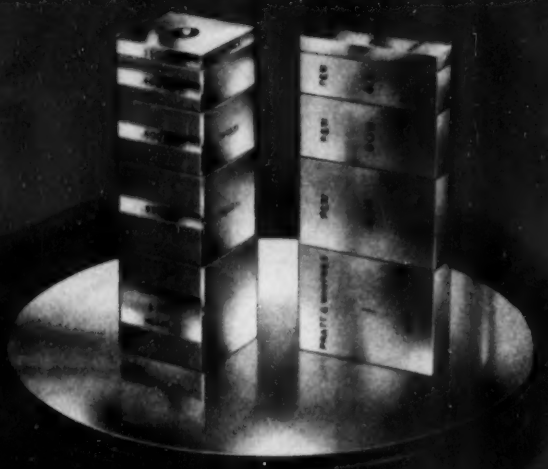

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ACCURACY* — FOR STANDARD and SHOP

AVAILABLE IN A WIDE VARIETY OF SETS OR INDIVIDUALLY AS REPLACEMENTS FOR WORN BLOCKS

*TOLERANCES

Block Sizes	Standard Sets	Shop Sets	Block Sizes	Standard Sets	Shop Sets
1" and under (per block)	+.000004 −.000002	+.000004 −.000006	10" to 12" (per inch)	+.0000025 −.0000015	+.0000025 −.0000025
2" to 4" (per inch)	+.000004 −.000002	+.000004 −.000004	16" to 20" (per inch)	+.000002 −.000001	+.000002 −.000002
5" to 8" (per inch)	+.000003 −.000015	+.000003 −.000003	Flatness Tolerance Parallelism Tolerance	.000004 .000004	.000004 .000004

For complete information, write on your Company letterhead to the P&W Branch Office nearest you — or direct to West Hartford. No. 532

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WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

CUTTING TOOLS • GAGES • MACHINE TOOLS

ROUND TABLE Discussion

VARIETY SHOP

Does standardized shop equipment speed up production? Or does variety pay off in increased adaptability? Opinions vary . . .

WHEN THE AVERAGE shop starts out in business, the men behind the venture have one object in view: to manufacture their product as efficiently as possible. If they are fortunate in a capital sense, they buy new machinery of the very latest type, carefully chosen to perform each operation in the minimum of time with the maximum of accuracy. If production makes it necessary to have more than one machine performing the same operation, and the one machine already in service is giving peak performance, it would be foolish not to buy another machine of identical make, or a battery of such machines, for obvious reasons.

First of these reasons is interchangeability of parts and attachments, very useful in reducing downtime and cutting setup time. Another reason is service. Your supplier is more likely to be alert in filling your service requirements when he knows you have several of his type of machine instead of one. Then again, the men are more likely to become familiar with the controls of this type of machine if there are several of them available. This makes for a more fluid shop, because if Joe Doakes takes sick, or is afflicted with spring fever, there is no problem involved in finding someone to pinch-hit for him.

In the final analysis, I think there is a tendency to shy at the mention of the word "standardization"; to some people it has a static ring about it. After all, if you standardize on one type of machine to produce a certain part, the chances are favorable that the same machine will perform to your satisfaction on another job. Unless a machine has been designed and built to machine one part and one only, it is a safe bet to say that the average modern machine tool, whether used in the production shop or the toolroom has approximately the same range of speeds and feeds as its competitor. Usually each maker has some feature built into his machine which appeals to the buyer as being desirable in his par-

ticular setup. In this case it might be profitable to standardize on this particular unit for the sake of using the special gadget that this machine alone possesses.

Variety just for the sake of variety has nothing to commend it in equipping a machine shop; rather, there should be a valid reason for every item of equipment so that a cheaper and better end product may result. Standardization of the best available machines to fit the range of your products is bound to pay off.

Robert S Alexander
Greenville, RI

•

I FAIL TO SEE how any machine shop, high production or batch production, can hope to buy all one type of machine tool from one manufacturer. What do you do when the usual supplier of engine lathes cannot supply you with a gap lathe because he does not include one in his manufacturing range? It would certainly not be profitable to have him make one especially for you.

Standardization can be achieved on machines like automatics, presses (punch), radial drilling machines and the like, but the firm who limits its choice to the range offered by one particular manufacturer is running the risk of using out-of-date plant. All manufacturers have their periods when they bring out no new ideas and just drift along with the current. The machine-tool user who is tied to such a manufacturer will have to drift with him until he has a burst of energy and puts out some new ideas.

The great attraction to the American machine-tool user in standardizing on one make of machine tool lies in the ready availability of spare parts. To my way of thinking, this

"We should never have announced their vacations ahead of time! Production has been awful this week!"

Accuracy in STATISTICAL QUALITY CONTROL

PRATT & WHITNEY
Tri-Roll Thread Comparator
WITH PRESSURE CONTROL

FEATURES FAST, ACCURATE INSPECTION OF EXTERNALLY THREADED PARTS

LONG ACCURATE LIFE — because the rotatably mounted gaging rolls revolve with the work, distributing wear evenly.

FULL LENGTH ROLLS — provide a complete functional check on the thread.

ERRORS IN LEAD, ANGLE AND PITCH DIAMETER — are read cumulatively on the indicator dial, and a visual check may be made at the same time.

PORTABILITY — allows use on the inspection bench or right at the machine.

FRAMES MADE IN SEVEN SIZES — accommodate part diameters from No. 0 to 1½ inch.

Write on your Company letterhead for Bulletin No. 300-BA.

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They're calling him "Mr. Genius" now!

More production per grinding wheel dollar. That's why George is the boss's brainy boy. How did he get that way? Simply by changing over to a grinding wheel slightly different in grain and grade . . . a Simonds wheel, naturally. This could be a right, bright production boosting idea for you too. You'll find everything you need in our complete line . . . grinding wheels, mounted wheels and points, segments, abrasive grains. Let's send you our free Data Book and the name of your nearby Simonds Abrasive Company distributor.

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grinding wheels

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

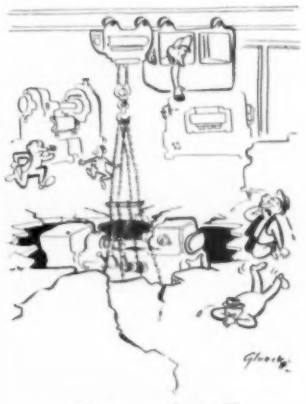
love of available spares on the part of American users is a snare and a delusion which they labor under constantly and thereby are dissuaded against buying foreign equipment. British manufacturers who have tried to sell their equipment in the USA have come up against this desire for spares and have been considerably puzzled and annoyed about it. Why?

In the first place, the manufacturer does not expect his machine tools to break down. Secondly, if a breakage does occur, it should be of such a minor character that a good maintenance crew could put it right in a few hours. It is only when a major disaster occurs to a machine that the maker expects to be called in.

In Britain, we are conditioned to maintaining our own equipment. Our shops contain machine tools manufactured in our own country, the USA, and the whole of the continent of Europe. We do not expect to get spare parts, particularly for American equipment, but we buy whatever is available in the way of good tools. During World War II we bought a lot of machines from the US, and the availability of spares was the last thing we thought of—if we gave it a thought at all.

In my own 25 years of workshop life in about 20 different plants, I can recall only two instances where manufacturers' spares have ever been used on machine tools. Any maintenance gang that I have known would be insulted if it was suggested that they use a spare instead of repairing the machine themselves. Apart from replacing headstock roller bearings, I cannot imagine what can go wrong with a machine tool if it is used correctly.

Any engineering firm worthy of the title should be able to repair its own equipment and make any neces-



"Okay, now where to?"

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1952

WELDED STEEL SIMPLIFIES CONSTRUCTION IMPROVES PERFORMANCE, CUTS COST 33%

By **Russell M. Roberts,** Chief Engineer,
Parks Woodworking Machine Company, Cincinnati, Ohio

Changing over our hand saw frame to welded steel design has simplified many production problems while cutting costs by one third.

The original cast construction (Fig. 1) called for machining a complicated casting on which foundry rejections were common. The present welded steel design utilizes simple square tubing, sawed to size, clamped in a plain fixture and butt welded. The efficient use of steel has cut weight by 37% while increasing strength and rigidity.

An added benefit, made possible with welded design, now permits independent leveling of the work table that formerly could be accomplished only through a major adjustment of the frame itself.

Fig. 4—All Welded Steel Frame *for the Parks Woodworking Machine Co., Cincinnati, Ohio. Sides are brake formed from 12 gauge metal.*

Fig. 3—Simple Jig *for welding square steel tubing components consists of clamps and locating pads.*

HOW TO DESIGN IN WELDED STEEL
Complete training course for designers and production engineers now available for presentation in your plant. Send for complete details.

PROPER DESIGN IN WELDED STEEL ALWAYS IMPROVES PRODUCT, LOWERS COST

Fig. 1—Original Construction— *Machine bracket formerly weighed 56 pounds, was difficult to cast, high cost incurred from excessive rejects.*

Fig. 2—Welded Steel Design *is stronger, more rigid yet weighs only 35 pounds. Weldment costs 35% less than original casting. Eliminates considerable time in machining and assembly.*

HERE'S MORE PROOF

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 107.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

Get a better grip on production

Levermatic
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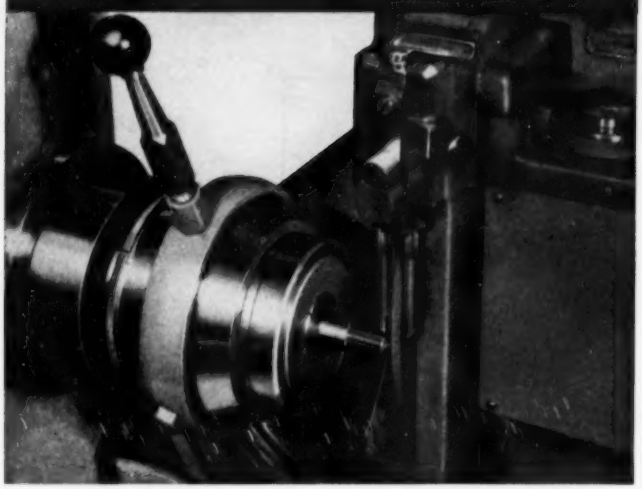
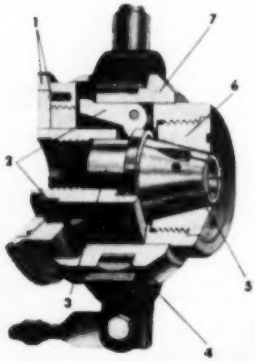


Two inch Levermatic Chuck on a thread grinder. Note length of piece from nose of collet to grinding wheel. Extreme accuracy was still obtained. Eliminated grinding between centers on short pieces. The Levermatic collet chuck is setting a new standard for *instant* internal and external gripping and releasing. For engine, toolroom and turret lathes, millers, drill presses, grinders.

- Unequalled Gripping Power
- Highest Precision Accuracy
- Economy and Labor Saving
- No Heat or Friction
- Simple Finger-Tip Adjustment
- Full Spindle Capacity
- Faster Chucking
- Quicker Collet and Arbor Change
- Easy Mounting—Less Overhang



1. Selective pressure adjusting ring with positive ball detent lock.
2. Hardened cam levers (three).
3. Collet pusher sleeve.
4. Self-lubricating bronze yoke shoe.
5. The new Co-netic Collet — new parallel grip design.
6. Precision ground collet closing ring.
7. Positive cam closing collar.

SUTTON TOOL COMPANY
Department AM-8, Sturgis, Michigan

SUTTON TOOLS

sary replacement parts. It is not machine parts that cost the money, but the downtime of the machine under repair. A good repair gang can get a machine going in about eight hours and make the replacements. A spare part could not be obtained in less than two days.

I will admit that the hydraulic and electronic equipment on many present-day machine tools calls for maintenance skill above that of the average machinist and the manufacturer must be called in to repair such machines. But to suggest that spares should be available for the average drill press, capstan lathe and shaper is carrying demands to ridiculous lengths. Any firm who closes down a machine for several days and waits for delivery of a spare when their own shop could repair the machine in a few hours has very peculiar ideas about economic manufacturing and deserves to suffer for its stupidity.

Clifford T Bower
London, England

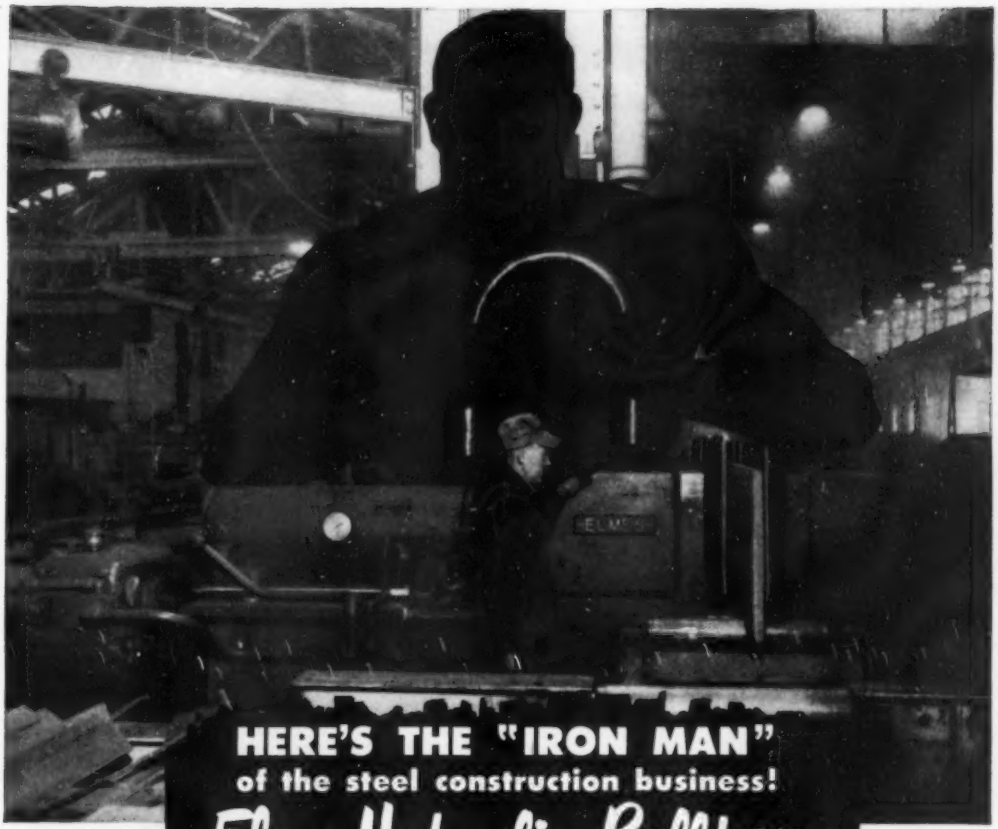
•

THE PURCHASE of machine tools by various individuals will produce a variety to satisfy the whims or prejudices of each one. Generally the foreman is more interested in getting a new piece of equipment to do a certain range of work. The purchasing agent is interested in getting a good delivery (of both the machine and a quart of liquor). The comptroller is concerned wiith the price and available cash. As a result, the shop gets a machine within the allowance of the budget, quickest delivery, and close to the size requested.

The influx of foreign-built machine tools is an indication of this trend. These machines are available for immediate delivery and at a lower price than a domestic one. The quality of these machines in most cases is comparable to the standard American-made tools for the money. Replacement parts are available but the service is not prompt. For a long-range program, if the purchaser orders spare parts with each machine, his downtime can be decreased.

Most machine-tool builders carry a full range of sizes of their lines to give a reasonable variety. Through proper planning a complete range of sizes and types of one make of machine tool can be installed. This would standardize the machines and permit a minimum inventory of spare parts. The operators could move from one machine to another without a refresher course.

There is one company that uses this procedure and has over 20 ma-



HERE'S THE "IRON MAN" of the steel construction business!

Elmes Hydraulic Bulldozer

Shown in operation is a 200-Ton Elmes Hydraulic Bulldozer, working in the shop of one of the country's larger steel construction companies. This customer reports his Elmes Bulldozer *"has been busy without interruption since it was installed . . . has performed a tremendous amount of bending and straightening work . . . turned out a greater number of pieces than ever anticipated."*

There are sound reasons why Elmes Hydraulic Bulldozers receive such enthusiastic recommendations. They're built rugged for rugged work — heavy bending, forming, straightening. Bed and frame are of simplified, solid design, using bolted and keyed construction of structural steel. And the design is *clean*. Top of the press is clear—free from obstructions. Pumping unit is located low, at the end of the press. The press is protected. You can bring work to the press—position it quickly, from an overhead traveling crane. Head is adjustable for varying the work space opening.

Elmes Hydraulic Bulldozers are available in capacities up to 500 tons, with bed size, stroke and speed optional to suit your requirements. Your Elmes distributor can give you full details on these versatile presses and on the complete line of Elmes Hydraulic Metal-Working Presses. See him now—or write us for Bulletin No. 1010 B.

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ENGINEERS

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TO GET YOUR NEW PRODUCTION GOING AND KEEP IT GOING

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19651 JOHN R STREET
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INQUIRIES PROMPTLY ANSWERED

chine tools made by one builder. These machines range through all sizes, as well as specials. Replacement parts are carried in stock by a local service office which minimizes downtime.

Some foremen have preference for certain machine tools because of past experience, recommendations made by fellow employees, or sales literature. In spite of America's great productive capacity, quality, and developments, there are still "lemons," delayed delivery, obsolete features, and enormous price tags.

By a standardization program, the guesswork can be eliminated. The choice of the supplier can be determined by placing the names of machine tool builders in a hat and drawing three names. These three companies can be contacted to recommend the type and size of equipment necessary for specific tasks and offer quotations.

By studying the advantages and disadvantages, prices, delivery, and promised performance, the supplier can be determined. This method might seem too simple, but in effect it is as good as—if not better than—procedures followed today. Too many machines are bought from the agent who sends the best theatre or ballgame tickets.

Frank J Zarnowski
Rutherford, NJ

•

PLAY BALL

Does time off for the baseball opener raise or lower shop morale? How can the problem be handled if you suspect half the men will take the day off anyhow? Some of our readers say —

TAKING AN afternoon off from work to go to a ball game is similar to playing hookey from school to throw stones in the brook. The end result is not so important as the act of truancy. A scholar and an employee get more of a kick out of throwing down the traces and following an impulse than how they spent the day.

If tabulation were made of the number of men who attended a ball game over the week end or an authorized holiday, the percentage would be small. The thrill of taking a day or afternoon off to go to a ball game is enjoyed by many, but few men will sacrifice a day's pay to watch a game or to go fishing.

Closing down the shop for a ball game or the opening day of the hunting or fishing season would bring plenty of squawks. If the company declared it a paid holiday, only 20%

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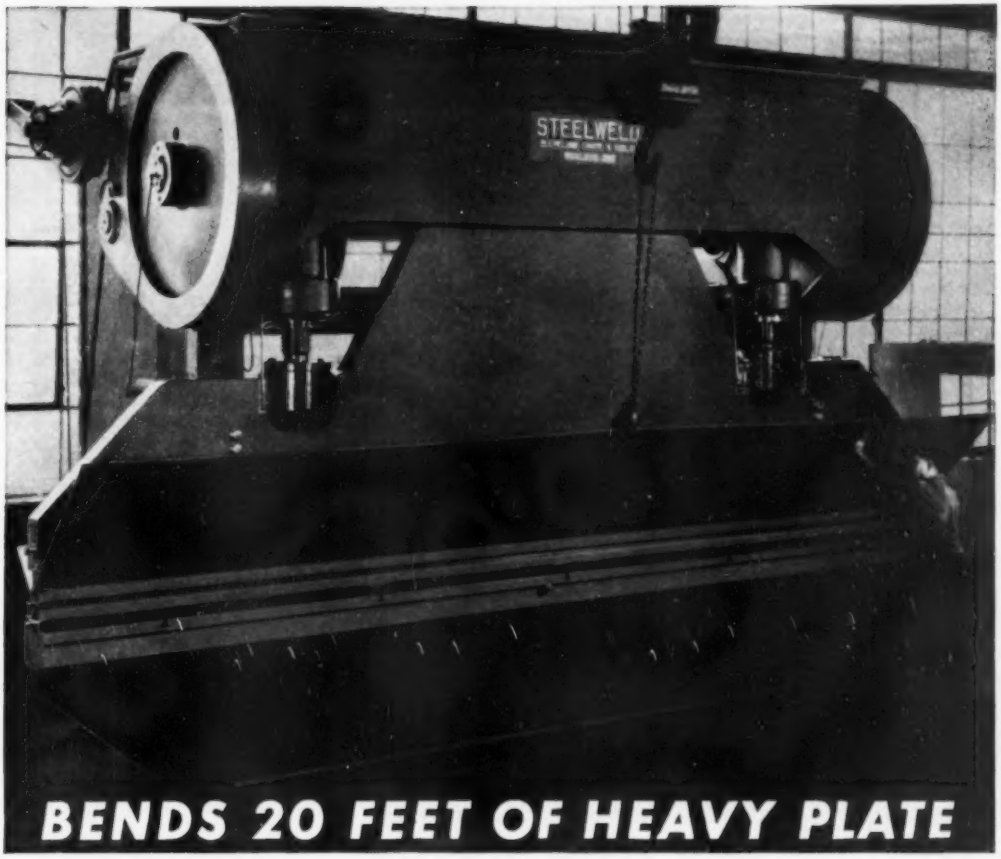

BENDS 20 FEET OF HEAVY PLATE

Model L 5 ½-12 Steelweld Press bending $\frac{5}{16}$" steel plate, 20'-0" long

How long does it take you to weld or rivet two $\frac{1}{16}$" x 20'-0" steel plates together at right angles? How long if you were making a U-shaped or Z-shaped item?

For work of this sort you will find a Steelweld Press a most useful tool. It will cut time and cost to a small fraction. You will save even when you only have occasional odd jobs. For production runs the reduction in time is tremendous. And you will save rivets and angles or welding rod and power too.

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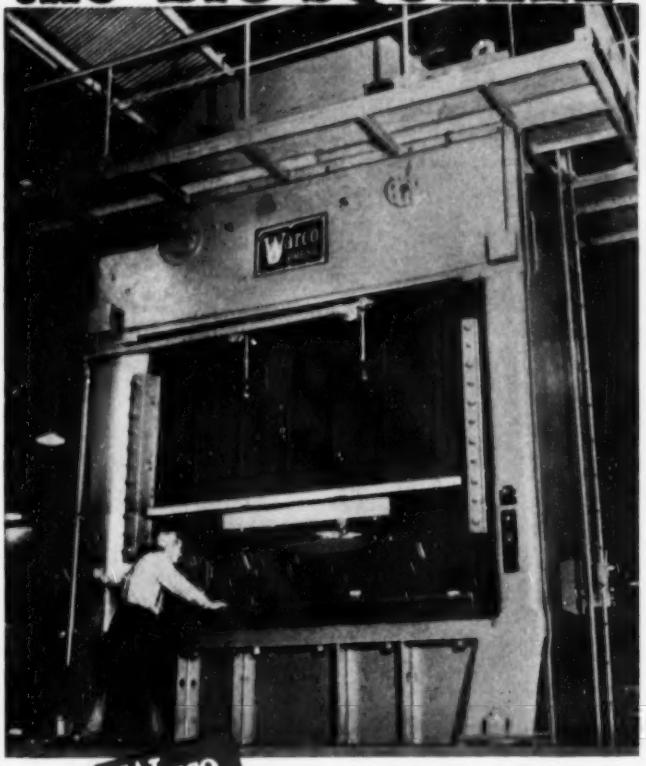

GIANT Warco PRESS SPEEDS AIRCRAFT PRODUCTION FOR RYAN AERONAUTICAL

One of four huge new Warco Presses which represent the largest equipment ever installed at the Ryan Aeronautical Company. Ryan is using the presses to stamp out large aircraft components and initial tests point to an eventual savings of thousands of man hours and many tons of machined materials. Stainless Steel exhaust cones for jet engines were first to come off the new presses. Ryan found they could not only produce the pieces in a fraction of the time formerly required, but a number of machines normally used were free to perform other work. Ryan now plans to make further use of the flexible power of these Warco giants to streamline the production of combustion chambers, liners, aft frames and afterburner parts. Take a tip from this leading aircraft plant — look over the modern line of Warcos before you buy . . . you'll be further ahead in the long run.

Federal WELDERS

Warco PRESSES

THE FEDERAL MACHINE & WELDER COMPANY

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would actually spend the day at the ball park or in the woods. Most men have plenty of homework that crowds their week end and would use this holiday for catching up. If the small percentage of local-team rooters can persuade the boss to pay them for attending the opening game, how about the hunters and fishermen?

Most men would appreciate being sent home on a hot, humid day to find a cool spot for resting their tired bones. The efficiency of the men during the dog days is very low. Letting the men knock off early during this period is not resisted. The loss of a day's pay during the summer months is not so important as in the winter or spring, due to the higher cost of living during the cooler months.

Giving the men a day off for the opening game or fishing will surely set a precedent. Other featured days will be looked for and some grumbling will occur when they are denied. During a rush period, it is a ticklish situation to deny time off for the opening game if it was previously allowed.

The best solution is to let those men who wish to take the day off, express their desires in advance and do it on their own time. This day can be taken from their sick-day quota or good attendance period. Production can be scheduled at a lower rate for these special days.

Frank J Zarnowski
Rutherford, NJ

•

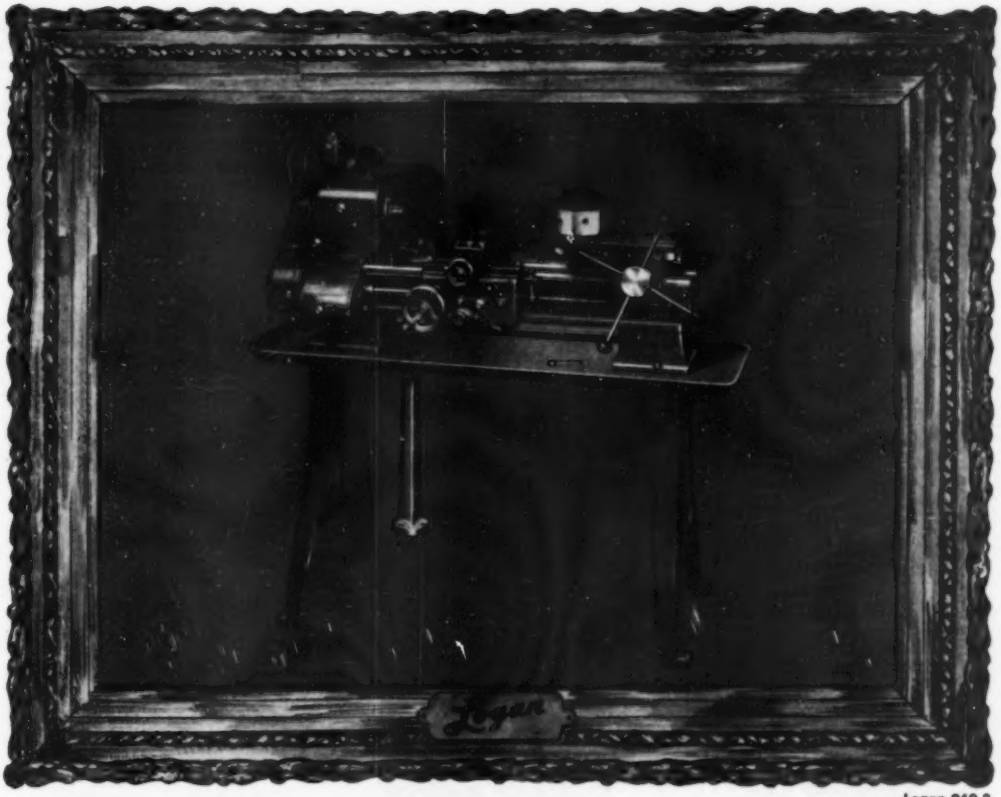
SHOP VEEP

What are points, pro and con, for deputizing a methods man to take some of the routine load from a foreman's shoulders? Does it detract from the foreman's authority, or will appointing a middleman result in smoother operation?

THE RESPONSIBILITIES of a foreman are so unlimited that any help he can delegate to his men makes his job that much easier. The size of the shop will determine how many specialists the foreman can have. In a six-man shop the foreman is the manager of all divisions including clerical.

The distribution of his responsibilities will require much discretion. If he picks the right men peace will reign through the shop. The biggest mistake most foremen make is appointing an eager beaver who annoys the men, or a yes-man who doesn't contribute any original ideas or suggestions.

In the larger shop, too many spe-



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11" Swing, 1" Collet Capacity,
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Industry's respect for the Logan Lathe as a metal-working production tool is not an overnight development. Through the years, Logan Lathes have put many a production line on a profitable basis. Today, with its 11" swing, 1" collet capacity, and 1⅜" spindle hole, the production efficiency of the Logan Lathe is being used on a wider scale than ever before.

The Logan is easily set up for every type of lathe turning operation. The Logan ball bearing mounted spindle has the sustained accuracy at high speeds to hold precision tolerances. The lasting accuracy and rugged durability of Logan construction keep production going at top efficiency, at minimum cost per finished part. For the production line, tool room or machine shop, no other lathe of comparable specifications can match the Logan in economy.

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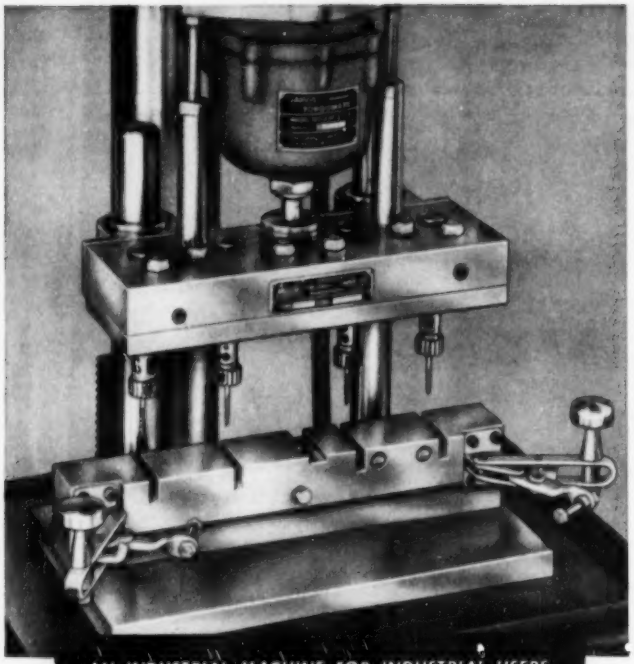

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cialists will keep the foreman away from his work. He will lose track of the men and of the work being done, and become an inefficient employee since he will soon depend upon his subordinates for decisions, facts, solutions, and those thousands of things that foremen are expected to have at the tips of their fingers.

Frank J Zarnowski
Rutherford, NJ

•

THE METHODS MAN, or planning engineer, is bound to prove profitable in even the smallest shop; any shop that allows a job to reach the machining stage without having any preconceived notions about how it is to be done must be very badly managed.

Shops do exist, all too frequently, that never foresee the unexpectedly difficult machining operation until it is handed to a machinist. It is obvious that if they have not foreseen this operation, then their original estimated price to the customer must be a rough guess and is not a carefully planned quotation of the true price plus a reasonable margin of profit.

Planning of a job should start at the moment when the customer's drawings have been received and an estimate is being prepared for the customer. The methods man must first see that the required machining operations are within the capacity of the available machines. He then begins to work out the machining time for the various details, by using synthetic times or observed times which have been complied in the shop. In the absence of standard times, he can compare the times taken on previous and similar jobs to the one he is estimating.

It is inevitable that in most jobs a component will occur which cannot be made with the available plant. It is here that the methods man shows himself valuable. By ingenuity, wide experience, and a flair for getting over difficulties he can conceive that special gadget or tool or machine set-up which will enable the job to be machined in the shop. He accordingly puts over the idea to the tool designer, or designs the tools himself.

Too many shops expect the foreman to be a jack-of-all-trades, performing a multitude of duties which he can never hope to carry out adequately. Planning of operations calls for meticulous attention to all details and facets of the job and the foreman can never hope to do his work well as a man who is expected

to give to it his undivided attention.

The idea of having a working machinist as methods man is a makeshift arrangement and not to be recommended. After all, the idea of appointing a method man is to prevent the foreman and 20 machinists from pondering and headscratching while their machines stand idle. The machinist-methods man would do all the pondering and puzzling for the whole shop and I fail to see how he would get any machining done at all.

Some small establishments may argue that they do not have sufficient work to keep a methods man fully employed. Those who make these assertions have no idea just how much time can be saved by employing a paid thinker. A small shop that had no other office staff or engineering department could employ very profitably a full-time methods man. He could fill out his time by making careful estimates of prices to quote to potential customers, compile standard times for future use, design tools and jigs.

One duty that is neglected by small shops is the studying of trade and technical journals. To my mind it is essential that some person in the organization be up-to-date on what is going on in the machine-tool field; the study of current trends by at least one man would insure that somebody could put his finger on required information or could bring an answer out of his head, as a result of reading the trade journals.

Even in the smallest shop, the methods man should be given a desk where he can work. He should be given a free hand to roam at will in any part of the plant. It is a sound arrangement to make him di-

"Look, McGillicuddi — 'Pretty please' ain't enough. You got to have a requisition!"

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HERE'S a remarkable new grinder that sharpens small twist drills with amazing speed and precision. Enables you to do away with expensive machine shop maintenance of 2-lip drills—No. 70 to ¼".

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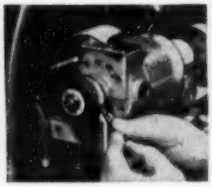

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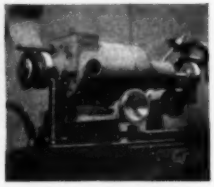

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rectly responsible to the president of the firm, or the owner, so that in the event of disagreement between him and other executives the final decision rests with the head man.

There is good material for planning engineers and methods men in all shops and I think that owners of small firms should always comb through their shop personnel when looking for men to fill administrative positions, before bringing in outside men.

Clifford T Bower
London, England

•

TRANSFER OR TAKEOVER?

Is a man ever so indispensable to a foreman that the shop team breaks down if the man is transferred to a higher job? Should a good assistant be retained for emergencies, or allowed to move ahead, even if it means shifting to another department?

SHOULD A topnotch understudy be taken away arbitrarily from the man who trained him, to head up another department?

I would say yes, definitely, but only if the man himself is agreeable and willing. By the time any man has reached the point where he is an understudy to an executive, he has a fair knowledge of his own worth, ability, limitations, and desires. Such a man will not relish being moved permanently from a position with a fairly secure future, to an untenable position for which he is not qualified or which he dislikes for some reason. On the other hand, the man he is understudying may be two young, too far from retirement, or too avaricious to make the job of understudy look attractive. In that case, the understudy no doubt will be rather eager to step ahead on his own.

The fact that Ed is losing a man he trained is no honest reason for him to cry the blues. That is simply life. It is sometimes tough for anyone to give up a man he has trained, but the dog-in-the-manger attitude is not a desirable character to develop either.

If any executive selects an understudy, explains to that man that from then on in, he is the real understudy, usually the executive can get the man to stick with him. However, the appointment has to be official, has to be known and accepted by everybody, and has to be backed up

(Continued on page 197)

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FYI—these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 GRINDING ATTACHMENT—*DoAll Co, Des Plaines, Ill.* 4-page bulletin 52-461 describes features of attachment for surface grinders permitting grinding of cylindrical and angular forms. Available accessories illustrated.

2 GEAR HOBBER—*Michigan Tool Co, Detroit 18, Mich.* 12-page bulletin 1458-52 gives design and operating descriptions, tooling layouts, for hydraulic clamping, and general machine specifications.

3 PRESS STOP—*Brinnell Co, Simsbury, Conn.* Illustrated bulletin describes electro-mechanical punch-press stop with single-stroke operation.

4 LATHE—*Cincinnati Universal Machine Co, Cincinnati 12, Ohio.* 4-page bulletin illustrates features and specifications of Weipert lathe with 18 spindle speeds from 12 to 660 rpm, equipped with taper attachment and speed selector.

5 PUNCHES — *Kling Bros Engrg Works, Chicago, Ill.* 4-page illustrated bulletin 712 gives features and specifications of line of Universal punches.

6 MAGNETIC SHIELD — *Diley Mfg Co, Cleveland 4, Ohio.* 4-page illustrated bulletin gives specifications and applications for use of magnetic grip-shield guard units on variety of machines.

7 TURBINE-BLADE GRINDER — *Pratt & Whitney, West Hartford, Conn.* Illustrated folder describes machine developed to bring automatic operation to the finish sizing of irregular and twisted profile sections of air-foils.

8 PRESSES—*E W Bliss Co, Canton, Ohio.* 20-page catalog 17-D gives data on straight-side, double-crank presses with capacities ranging from 50 to 2000 tons. Dimensions and specifications included.

9 MACHINE TOOLS — *Simmons Machine Tool Corp, Albany, NY.* First issue of quarterly publication gives case histories of new and rebuilt tools, including adaptations and operations.

TOOLS AND ACCESSORIES

10 COMPARATOR GAGE—*Moore Products Co, Philadelphia, Pa.* 8-page bulletin 6005-B supplies instruction on pneumatic comparator gages as to installation, operation, and maintenance. Specifications included.

11 ENGRAVER—*Gross Instrument Co, Cambridge, Mass.* Brochure describes adaptability to engraving requirements on metals, plastics, etc, in lettering of panels, scales instruments, tools, jigs and fixtures. Attachments and examples of work illustrated.

12 VISES—*Desmond-Stephan Mfg Co, Urbana, Ohio.* 28-page booklet illustrates and describes complete line of Simplex vises; specifications included.

13 POWER TOOLS—*Boice-Crane Co, Toledo 8, Ohio.* 52-page catalog illustrates and describes wide variety of tools for cutting, shaping, drilling, and finishing wood, metal, etc. Specifications on saws, grinders, planers etc, included.

14 DIAMOND TOOLS—*Standard Diamond Tool Corp, New York 19, NY.* 20-page booklet on care and use of diamonds in grinding wheel dressers. Includes illustrated examples of boring and cutting tools.

15 CUTTING TOOLS—*Mance Mfg Co, Bradley, Ill.* Illustrated 4-page catalog on line of portable tools including hand and belt cutters, for use with a variety of materials.

16 LATHE AND GRINDER CENTERS —*DoAll Co, Des Plaines, Ill.* 4-page bulletin 52-802 describes and illustrates line of centers with a replaceable alloy tip developed to withstand high temps and extreme pressure.

HEAT-TREATING AND WELDING

17 CONTROL SYSTEM—*Minneapolis-Honeywell Regulator Co, Philadelphia, Pa.* Data sheet 11.3-6 describes all-electric proportional control system furnished by Brown-Powerstat combination for heat-treating furnaces and other equipment to which a variable voltage transformer is applicable.

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FYI
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18 ELECTRICAL CONNECTIONS—*Erico Products, Inc, Cleveland 9, Ohio.* 76-page illustrated catalog describes the Cadweld process of welding with no outside source of heat, and gives specifications of connections used.

19 WELDING ROD—*Eutectic Welding Alloys Corp, Flushing, NY.* Leaflet TIS 997-P describes EutecRod 145FC, bronze welding rod with special flux coating permitting automatic alloy beading. Specifications and technical data included.

20 CASE HARDENING—*Surface Combustion Corp, Toledo 1, Ohio.* 4-page bulletin SC-159 gives data on standard batch furnaces with applications to a variety of carburizing.

PLANT-SERVICE EQUIPMENT

21 METAL CLEANING—*E F Houghton & Co, Philadelphia, Pa.* 6-page bulletin describes uses of alkaline, emulsion, acid phosphate, and surface active agent types of cleaners. List of cleaners for general industrial uses included.

22 DEHUMIDIFIERS — *Pittsburgh Lectrodryer Corp, Pittsburgh 30, Pa.* 32-page bulletin with 70 photographs and diagrams of installations describes applications for production, handling, and storage problems.

23 SWEEPER—*Moto-Mower Co, Detroit 1, Mich.* 4-page catalog describes new Commander unit with dual brushes operating in opposite directions, with vacuum dust control, adaptable to large and small areas. Specifications included.

24 PHOSPHATE COATING—*Detrex Corp, Detroit 32, Mich.* Leaflet describes Detrex 79, a cleaning compound which imparts a fine-grained coating to steel parts to provide a good paint bond.

25 HYDRAULIC CRANE BRAKES—*Wagner Electric Corp, St Louis 14, Mo.* 4-page illustrated bulletin describes braking system for controlling bridge motion of overhead traveling cranes, eliminating operator fatigue. Diagrams and applications included.

26 CORROSION-PROOF CEMENTS—*Atlas Mineral Products Co, Mertztown, Pa.* 12-page bulletin 5-2 provides data on four basic types; charts giving temp range of each, and resistance to corrosives included.

27 BELT CONVEYOR—*Rapids-Standard Co, Grand Rapids 9, Mich.* 4-page illustrated booklet LPV-52 describes Press-Veyor, Jr, elected unit for handling light-duty parts. Drawings and charted specifications given.

28 HYDRAULIC LIFT—*Century Products Co, Minneapolis 18, Minn.* Brochure illustrates and details uses of 1000-lb capacity, manually-propelled hydraulic lift for light and medium handling. Construction features and specifications included.

29 PALLET STACKERS—*Automatic Transportation Co, Chicago 39, Ill.* Leaflet on suspended-load Transtacker industrial trucks gives specifications and diagrams for telescopic and single-lift models of electric, driver-led unit of 181 series.

PARTS AND MATERIALS

30 FLOWMETER—*Minneapolis-Honeywell Regulator Co, Brown Instruments Div, Philadelphia 44, Pa.* Data Sheet 10.3-4 describes Potter-Brown Flowmeter for measurement of fluids over wide range of temps and pressures with accuracy of ½%.

31 CARBON STEELS—*American Iron & Steel Institute, New York 1, NY* —13-page booklet gives tables of chemical-composition limits of standard steels.

32 PUSH-BUTTON CONTROLS—*Arrow-Hart & Hegeman Electric Co, Hartford, Conn.* 12-page illustrated folder describes line of oil-tight units for mounting on machines or in control cavities.

33 METALLIZING FOR RESISTANCE —*Metallizing Engrg Co, Long Island City, NY.* Metco News, Vol. 6 No. 2 gives illustrated data on anti-corrosive system utilizing zinc and vinyl aftercoat, and other metallizing applications.

34 BALL AND ROLLER BEARINGS —*Gwilliam Co, Brooklyn 2, NY.* 16-page illustrated catalog-23 provides specifications, diagrams, and price of complete line.

35 GEARMOTORS—*Star-Kimble Motor Div, Miehle Printing Press & Mfg Co, Bloomfield, NJ.* Bulletin B-601 describes line comprising motor and speed reducer mounted in single housing. Specifications and illustrated applications included.

36 SELF-LOCKING FASTENERS—*Elastic Stop Nut Corp, Union, NJ.* 16-page illustrated catalog 800 provides engineering data on Rollpins—slotted chamfered spring pins to be used in place of rivets, set screws, lock pins, etc. Graph charts included.

37 CARBON STEEL TUBING—*Tubular Products Div, Babcock & Wilcox Co, Beaver Falls, Pa.* Data card TDC 142 contains information on mechanical and physical properties, upsetting, swaging, etc, of seamless and welded tubing.

38 BUSHINGS—*Allis-Chalmers Mfg Co, Milwaukee 1, Wis.* 4-page leaflet 2087811 gives dimension of stationary-control Vari-Pitch sheaves equipped with Magic-Grip bushings for use with Q- or R-section belts. Installation information and specifications given.

39 VACUUM METALLIZING—*F J Stokes Machine Co, Philadelphia, Pa.* 12-page illustrated brochure gives details of complete coating process, including pretreatment, drawing of vacuum, metallizing, and finishing. Variety of coatings described, and metallizing units are pictured with specifications.

40 SET SCREWS—*Set Screw & Mfg Co, Bartlett, Ill.* 28-page catalog and reference book illustrates and describes various types of standard and self-locking units, together with data on dimensions, prices, heads, points, and materials.

41 ROLLER CHAIN—*Link-Belt Co, Chicago 1, Ill.* 148-page data book No 2457 gives detailed information on selection, installation, lubrication, and maintenance of roller chain for drives and conveyors and sprocket wheels, plus 50 typical conveyor chain attachments.

42 LOW-ALLOY-STEEL RUSTING—*International Nickel Co, New York 5, N. Y.* 36-page booklet with tables, graphs and photos on "A Theory of the Mechanism of Rusting of Low-Alloy Steel in the Atmosphere." Results from tests on 71 low-alloy structural steels exposed in industrial and marine atmospheres; new theory of mechanism of rusting, accounting for improved corrosion resistance.

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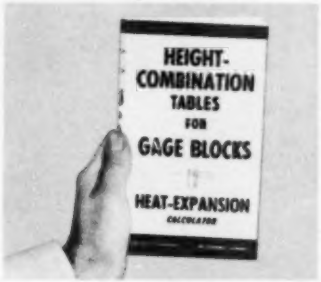
DoALL PRODUCTION NEWS

Vol. 1 Published by The DoALL Company, 254 N. Laurel Ave., Des Plaines, Illinois No. 7

New Book Lists Combinations of Gage Blocks for Any Dimension

The process involved in selecting gage blocks to obtain a combination of the desired length for gaging, is greatly simplified through the use of the "Height-Combination Tables — Heat-Expansion Calculator Book" recently published by The DoALL Company. It reduces to a minimum the figuring required to determine gage block combinations and completely eliminates the somewhat tedious "last figure elimination process" and the calculations this process entails.



The DoALL Height-Combination Tables list directly the blocks to be used in forming combinations for each dimension in the range of .0001" to .9999" in steps of .0001", a total of 10,000 different dimensions. Two alternate or "substitute" combinations are listed for each dimension. This enables the user to construct the desired dimension even when certain blocks required for the initial combinations are not available. The missing blocks may be in use at the time on another application or may not be included in the set being used. Indicated alongside of each initial and substitute combination, are the sizes of the gage block sets from which a specific combination may be constructed.

The DoALL Heat-Expansion Calculator included in the book gives the corrections that must be made in the height of combinations which will be used for checking parts (other than steel) at temperatures above or below 68 degrees F., the standard measuring temperature. Such corrections are made to compensate for the differences in the coefficient of expansion between the gage blocks and the part to be checked. Corrections for this difference are not required when constructing combinations for checking steel parts because the expansion coefficient of steel and the gage blocks is virtually identical.

The Height-Combination Tables—Heat-Expansion Calculator book is sold through all DoALL Sales-Service Stores for $2.95 each.

NEW DoALL "DC"* BLOCKS OUTLAST ALL OTHERS

Made of New Material Ideal For Gage Blocks; Rust- and Corrosion-Proof; Same Expansion as Steel; Remarkably Wear-Resistant

New DoALL "DC" Blocks manufactured of an entirely new man-made metal, offer a combination of characteristics long sought, but never before attained, in gage blocks!

1. **Great Wear Resistance** — the wearability of DoALL "DC" Blocks is many times that of steel gage blocks and is superior to chrome plated steel or tungsten carbide blocks. The new blocks can be used freely as working tools.
2. **No Thermal Expansion Errors** — the coefficient of new DoALL "DC" Blocks is practically identical with that of steel. The blocks are interchangeable with steel blocks and can be used to measure steel of the same temperature without regard for thermal expansion.
3. **Light Weight** — less than half the weight of tungsten carbide blocks, approximately the same weight as steel.
4. **Corrosion- and Rust-Proof** — under conditions normally encountered in gaging, DoALL "DC" Blocks will neither rust nor corrode.
5. **Perfect Stability** — because inherent stability—does not change size.

DoALL "DC" Blocks are lower in price than tungsten carbide blocks and, on a basis of life and upkeep, cost appreciably less than steel gage blocks. They are now available, in limited quantity, in the 83, 37 and 35 piece sets. Also available is a new set of eight steel blocks with DoALL "DC" wearing surfaces for large dimensional work. Block lengths are 5, 6, 7, 8, 10, 12, 16 and 20 inches.

A new bulletin and complete information regarding DoALL "DC" Blocks is available upon request.

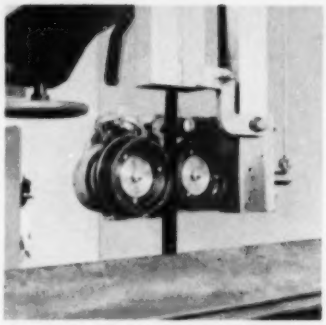
*"ORIENTED" chrome carbide Patents Pending.

----See Next Page-->

New Right Angle Saw Guide Adapter Makes it Possible for DoALL Machines to Cut Off Work of Unlimited Length

Length of Work Piece Limited Only by Clear Working Area on Each Side

A new saw guide adapter, for mounting on DoALL band machines, turns the blade at a 90-degree angle to normal travel for cut-off work on long pieces. The length of the work piece is limited only by the clear working area on each side of the machine, not by the machine itself. The work is placed to the right of the blade as the operator faces the machine. To facilitate handling and feeding of heavy pieces, a special hydraulically operated work table is available as illustrated.



Above—Special hydraulically operated work table for feeding long, heavy work pieces into DoALL band machine for cut-off jobs.

Upper left—Close-up of new saw guide adapter which positions guides and blade at 90-degrees to standard position for cutting off long pieces.

DoALL

GROUND FLAT STOCK QUALITY starts at the ELECTRIC FURNACE...

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THE quality of DoALL Precision Ground Oil Hardening Flat Stock is *guaranteed*. The analysis is correct. The steel is uniform. The surface finish is right. The dimensions are accurate. The most exacting quality control insures this. This means easy, fast machining, perfect hardening, elimination of rejects and lost time. You get longer wearing tools, dies and parts for your plant. Prompt delivery. Call DoALL today—ask for size and price chart.

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DoALL

Surface Roughness Scale Speeds Production

General Electric surface roughness scales, available from DoALL stores, provide a common standard of comparison for the designer, draftsman, machinist and inspector. They speed work and eliminate error. The user can compare surface finish of a piece by sight and feel. The scales illustrate 10 degrees of roughness which range from the smoothness of a bearing surface to the roughness of a flame cut. Calibration is in micro-inches RMS. Details available upon request.

G. E. Surface-roughness scales for comparing machine surfaces by sight and feel.

New 1" and 10" Optical Flats Aid Inspection

The DoALL line of optical flats has been enlarged by the addition of two new flats of unusual size. One is exceptionally large. It has a 10" diameter, to afford adequate area for checking the flatness, size and parallelism of large pieces. The other is very small, 1" in diameter, to facilitate checking tiny surfaces such as the anvil of a micrometer or the ends of precision studs, etc.

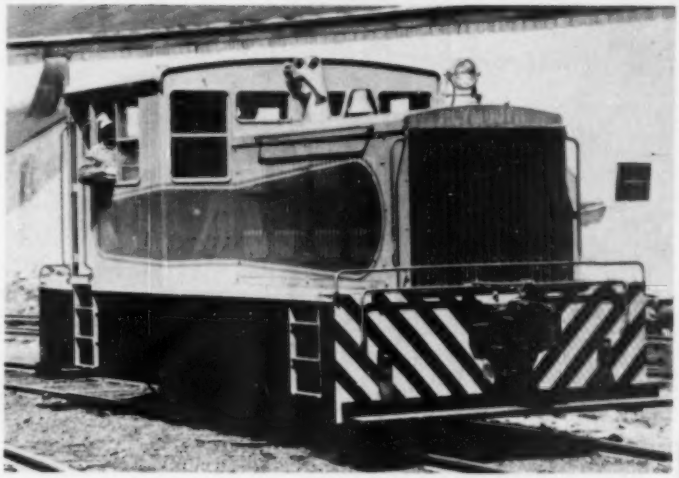
Several accuracies are available. In terms of "deviation from absolute flatness" these accuracies are: one millionth (.000001"), two millionths (.000002"), and five millionths (.000005"). Each flat is marked with the exact accuracy in millionths of an inch and this accuracy is maintained the full width of the flat.

The flats which may be obtained with one or both surfaces lapped to the stated accuracy, are manufactured of pure, fused Brazilian quartz, selected for clarity and having minimum thermal expansion. All edges are smoothly ground and beveled and the sides are wrapped in a black band. Arrows on this band indicate the measuring surface or surfaces.

DoALL also manufactures optical flats in diameters of 2", 3", 4", 5" and 6". Some of these sizes are also furnished in square as well as circular shapes. Special flats of special accuracy, shape or size, or with holes for checking shoulders are also made to order by the company. Complete details are available upon request.

83 Inspections Insure Quality of DoALL Saw Bands

In the manufacture of DoALL Saw Bands, both in the company's United States and Canadian plants, 83 exacting quality control inspections are employed. From the raw steel to the packaged product, DoALL saw bands are inspected for steel analysis, width, thickness, camber, edge radius, tooth formation, set, hardness and many other critical characteristics. DoALL Saw Band quality is unconditionally guaranteed.



Plymouth 35 ton Locomotive made by the Fate-Root-Heath Company, Plymouth, Ohio.

DoALL MP-20 Band Machine Slices Heavy Steel Parts Twice as Fast as Torch Cutting

Ohio Firm Speeds Work on Locomotive, Brick Machine Parts up to 1½" Thick

Typical manufacturing economies possible with modern band machining are clearly shown in a direct comparison between band sawing and torch cutting at Fate-Root-Heath Company, Plymouth, Ohio. In the company's Type JL Plymouth Locomotive, a 1⅝" thick SAE 1045 steel drive sprocket is split and then bolted to a hub keyed to the axle. This permits easy sprocket replacement without removing a wheel. This piece was formerly split by torch cutting, requiring a second operation of deburring. It is now neatly sliced in two on a DoALL MP-20 band machine in half the time and the deburring operation is completely eliminated.

Brick Machine Parts

In the brick and tile making machines produced by the same company, a 1⅛" thick steel casting was formerly torch cut in 7½" minutes and the edges were then rough ground. With the DoALL MP-20, the job is sawed in three minutes and grinding is unnecessary.

The DoALL MP-20 Contour-matic Band Machine has an infinitely variable speed range from 40 to 10,000 blade feet per minute, making it suitable for every conceivable band machining job including friction sawing. It will handle all DoALL Band Tools including saw bands, diamond bands, line grind bands, file bands, knife bands and polishing bands. It can be used to cut, grind or polish all metals, woods, plastics, glass, rubber, ceramics, cloth, paper and other materials. Literature and information is available upon request.

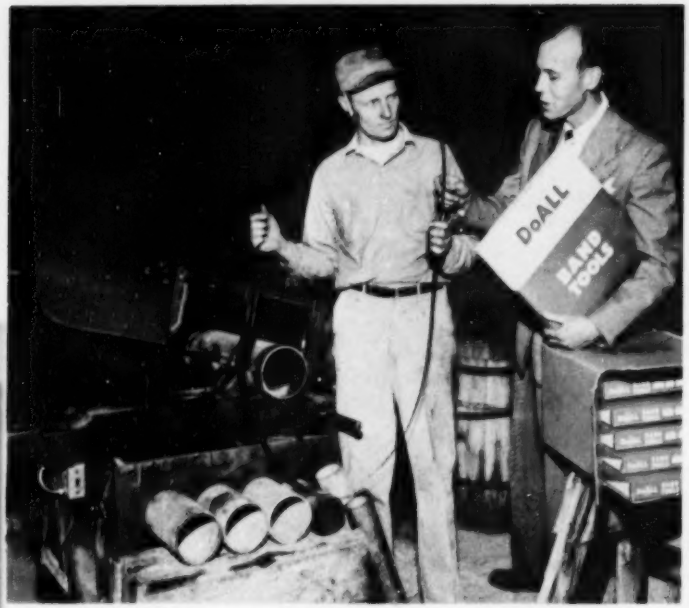
DoALL MP-20 slicing 1¼" thick steel casting in less than half the time required for torch cutting.

DoALL Products Represented in 65 Countries

71 agents in 64 countries outside of the United States, sell and service DoALL products. Additionally, 35 DoALL Sales-Service Stores in the United States, plus two in Canada and one in Mexico, stock and demonstrate DoALL equipment and supplies.

----See Next Page-->

Saw Band Selection Know-How Pays Dividends to Users



A DoALL Saw Specialist discusses blade selection at Reuben L. Anderson, Inc., St. Paul, Minn.

Customer Reports Blade Life Upped 4 Times

Recognizing that even the finest quality saw band will fail to perform properly if misapplied, DoALL trains its Saw Specialists to help customers get the blade with the right tooth design, pitch and set for each job. This kind of help paid off for Reuben L. Anderson, Inc., St. Paul, who report that DoALL saw bands on their Kalamazoo cut-off saw last four times as long as the blades previously used. The combination of DoALL "Certified Quality" and selection of the right blade for the job is the reason for the improvement.

Band Tool Manual

The new 160-page DoALL Band Tool Manual is now available. It contains data on selection and use of saw bands and other band tools for every contour and straight cutting or band machining job. Copies are available for $2.00 per copy.

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by the official perquisites that go with the job. These perquisites would be a raise in pay, some suitable title, a desk perhaps, maybe a private parking place, and a modest share in those class privileges that go with his superior's job.

But if an executive simply selects a man himself, and gives him vague hints and half promises, without officially designating him as his successor, that man has no official status in his or anybody's eyes. And in that case the executive can only blame himself if the man accepts his first chance to step out on his own.

James K. Matter
Detroit, Mich.

•

THE PROBLEM that faces Ed is one which comes up many times when a company is growing or is in need of younger blood to handle supervisory positions. It is the function of every supervisor to train some individual who can take over the reins of the department. How well this training is done tends to indicate how good a foreman or supervisor the man is.

The scope of an assistant naturally is going to be very narrow and would tend to make the individual a one-department man. We would know little, if anything, about the function of other departments or how they are managed. Actually, as an assistant, he has no reason to know. Yet when such individuals are called upon to take over, many times they are lost. They suddenly become associated with supervisors who have been in control of departments much longer, and the tendency is toward reluctance to admit their non-knowledge of situations existing within the plant as a whole.

Therefore, it is well to think about this problem ahead of time. Since most foremen do not consider this

"Furthermore, I want you guys to quit using our bearing balls for your marbles!"

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Leading Heating Control Manufacturer Adopts Millers Falls Electric Drivers For All Precision Assembly Lines

The Problem: Setting large numbers of machine screws and nuts in delicate, complex electronic control assemblies. Speed and economy essential. Torque must be maintained constantly at all points with extreme accuracy.

Solution: Demonstrations and test runs were conducted with numerous electric and pneumatic tools. On every count, Millers Falls Screw Drivers and Nut Setters with the "Adjustomatic"® Clutch were outstanding for this difficult assignment.

They are powerful, compact, smooth running. And the patented "Adjustomatic" Clutch maintains exactly correct tensioning not just for a day, but for month after month. Their performance has proved so superior that Millers Falls Drivers are now standard on all precision assembly lines in the plant. Approximately 100 are currently in use, and the company reports: ". . . very materially increased production and reduced cost."

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Write for full details on these and other high-efficiency Millers Falls electric production tools — drills, bench and portable grinders, sanders, polishers, hammers and saws. Demonstrations arranged on request.

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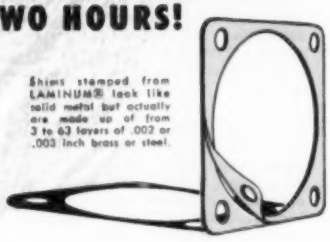

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Adjusting bevel gear mesh with a laminated shim is a matter of two seconds to remove a lamination!

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step in assistant training, or if they do, are handicapped in getting the idea and method of operation across, it is better to have higher management handle the problem.

It naturally may seem to the foreman that the props are falling away from him when his assistant is suddenly removed. The effect of this shock can be lessened if management will set up rules and regulations. The taking of the foreman into the confidence of the top-level supervision and the discussing of training plans can help eliminate problems such as the one facing Ed.

Now Ed's statement that the loss of one man would upset his production team is, or at least should be, a little far-fetched. However, some foremen have been known to become so dependent upon certain individuals that a shop does collapse when one certain person is removed. This situation cannot be condoned by a company, and perhaps Reynolds realized that Ed was leaning a little too much on Millikin.

In training assistants it is well to bear in mind that while they must be trained to be capable of taking over the job, one must not entirely depend upon them to do the supervisor's work. No supervisor can afford or should want to stand in the way of his employees. The choice of an individual trained by the supervisor is a feather in that supervisor's cap.

Remember that each individual who becomes a member of the supervisory group becomes part of the management team. Your training of these individuals reflects as they develop in their new position. No man should be frozen on a job just because he was slated someday for the next step in that department. A company must see that its personnel is used to the utmost. Holding men back does not fit into this plan.

The farming out of the individual

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helps to hold his interest and also tends to make him a better supervisor, since he has a broader knowledge of the company's activities. When the time comes to advance Ed, our friend Millikin will be much more able to do a better job at supervising than had he stayed under Ed for years.

It is hard on a supervisor to continually train people, but if one doesn't like to take the bitter with the sweet then he should go back on the machine. Supervision is not all sugar, and when the problems that are bitter come along we have to face them squarely. In so doing we are better able to handle more problems and advance up through the management ranks.

Charles D. Townsend
West Hartford, Conn.

•

MUCH AS I sympathize with Ed in the loss of a capable assistant, I am of the opinion he is inclined to look at the trees instead of the forest. On the other hand, Reynolds, being compelled by reason of his position to look at the overall production picture, cannot allow his milling department to lag behind when he has a capable man available to step in and keep it producing to capacity. I am pretty sure if Ed were in Reynolds' shoes he wouldn't hesitate in transferring Millikin under the same set of circumstances.

Which brings us down to Millikin—how does he feel about the situation? I rather imagine, like most assistants, he welcomes the opportunity to step up and show what he can do in the higher bracket. From his point of view then, Ed would be doing him no favor by attempting to retain him as an assistant. Even if Reynolds intends to transfer Millikin on a temporary basis, the assistant would have a right to feel aggrieved

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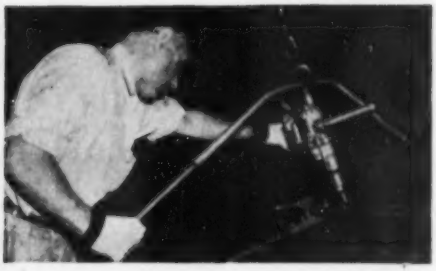

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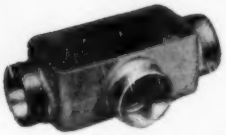

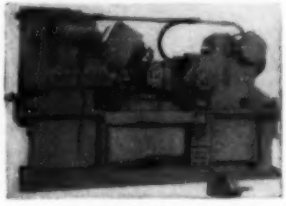

The examples of work shown here are typical of the wider variety of parts being produced on these new machines.

SEND FOR detailed information on this new machine. Let us have samples of your work in order to give you time and cost estimates for handling it on the "1-2-3" Goss & De Leeuw.

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at any effort of Ed's to block his transfer. No young man worth his salt likes to remain in the background when there is a chance for him to enhance his value in the eyes of the company.

So Ed would be well advised to let the young man go with his blessing, hoping his bereavement is only temporary, but in the meantime he could be looking around for a likely successor to groom as his assistant in the event that Reynolds decides to keep young Millikin in the new job. From my own experience, there are usually at least two or three likely prospects in any department to choose from, and Ed should have no difficulty on that score. Of course, if Ed is inclined to throw up his hands in a "What's the use," attitude and struggle along without an assistant, then he is only penalizing himself. A little time spent in breaking in a new assistant will pay off in eventually relieving him of the burdensome details he would have to shoulder singlehanded.

Lastly, let us look at it from Reynolds' angle. Having been through the mill himself, he knows how Ed is feeling at losing his right-hand man, but he also knows the value of a fluid supervisory force in an emergency and obviously had his eye on young Millikin. Knowing the care that goes into the training of a good assistant, he can recognize Ed's value to the company and be properly appreciative, providing Ed doesn't react too vehemently and confines his blowing off steam to the ears of his friend Al!

Robert S. Alexander
Greenville, RI

•

REYNOLDS has undoubtedly looked the field over thoroughly and has decided that Millikin is the best man available to take over the milling department.

Instead of considering what is best for the whole factory, Ed has only thought of what is best for his own department, and not being responsible for any other department, should not be criticized for his desire to keep Millikin. Reynolds' position places a responsibility on him beyond the border of the division of which Ed has charge, and, therefore, sees the need to adopt any change that is likely to benefit the organization as a whole.

It could hardly be expected that Ed would have the chance to exercise the same broad view of matters. But he should feel duty-bound to give the matter the most careful consideration when his attention is

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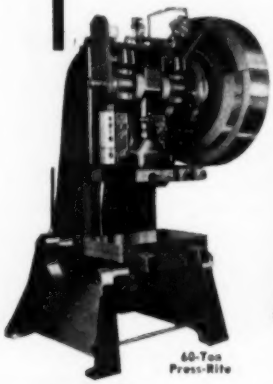
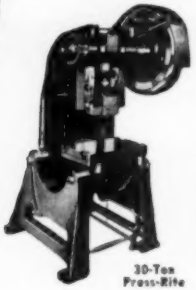


60-Ton Press-Rite



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SSMT

called to it, and not make his objection known until he has had ample time and opportunity to study the case thoroughly.

Reynolds' position with the organization is such that he must constantly be looking for men who are capable of filling more important jobs, and, of course, making changes with as little friction as possible.

No employee should be kept on the job where he is working when there is an opportunity for him to give more valuable service in some other position.

Abel Blakeman
Watervliet, NY

•

DOUBLE TROUBLE

What is the best way to bring about cooperation between double shifts? Does a night crew tend to be more careless with machines, more thoughtless about leaving things in good shape for the next shift? Some opinions . . .

ED'S OFFHAND idea that it would be different it Brigden reported to him is a good one, but evidently one born too late. If such arrangements could have been made when the second shift was instituted, and Brigden had been put in charge of it, things might have worked out all right. To attempt to institute such a change now, so far as Brigden is concerned, would undoubtedly lead to trouble.

It would be a good idea for Ed to stay over onto the second shift for an hour and have a talk with Brigden, provided he is able to broach the subject on a mutual advantage basis. If he goes to Brigden with a howl about getting the short end himself, he is almost certain to meet with opposition. If he stays over to see him on a friendly basis, and opens the subject from the standpoint of making things better for *both* shifts, he will probably get at least a reasonable amount of cooperation.

There is another proposition which involves use of a third supervisor, working on a split shift, with the two halves of that split shift arranged in such manner that he is there for the last portion and the first portion of both shifts, or over both transition periods. Such a man can do much to iron out confusion which otherwise inevitably carries over from one shift to the next. Since this would be his direct responsibility, he would not only be unable to pass the buck himself, but would be able to put polite pressure on both other supervisors, so far as buck-passing was concerned. Ed is the oldest man on the job, and it might be well, in the

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particular case involved, to give him this split-shift position, if he would have it.

It is almost inevitable that there will be gripes between shifts up to a point, however. So prevalent is the old custom of passing the buck that it is done continually between men on the same shift, and it is always far easier to find fault with some fellow who is absent than with one who is present. Therefore, no absolute cure is to be expected.

One thing which will contribute as much toward smooth running between shifts as anything else is for top management to give considerable attention to promotion of good will between top supervisors on respective shifts. Make bosom friends of Ed and Brigden, and the thing will smooth out amazingly. Al probably never would have heard Ed's little gripe.

From this it is evident that it is highly important, when appointing supervisors for different shifts, to do everything possible in advance to guarantee that they will get along well together. In this particular case, for instance, it would have been strategic for top management, before hiring Brigden or appointing him as supervisor of the second shift, to call Ed in on the proposition and see how he liked the man personally. It could be possible Ed does not like Brigden too well, in which case the stripped gear in the lathe apron and the worn drive on the old drillpress seem far more grievous to him than they actually are.

John E Hyler
Peoria, Ill.

•

DOUBLE SHIFTS should be avoided whenever possible, but under the present political strain, this idea is utopian. There are not enough machine tools in the whole Western World to warrant the necessary high production without running them at least two shifts.

All tools will, of course, be more strained when used 16 hours a day than when only during daytime. More breakdowns should be expected during the night shift. It is true, however, that too many abuses with the machines will occur on the night shift. Some of them might perhaps be prevented by better supervision, which, in its turn, will cost some extra money. Working too much overtime will probably give the same result.

If the machines are worn out faster than warranted by the number of hours run, then an investigation

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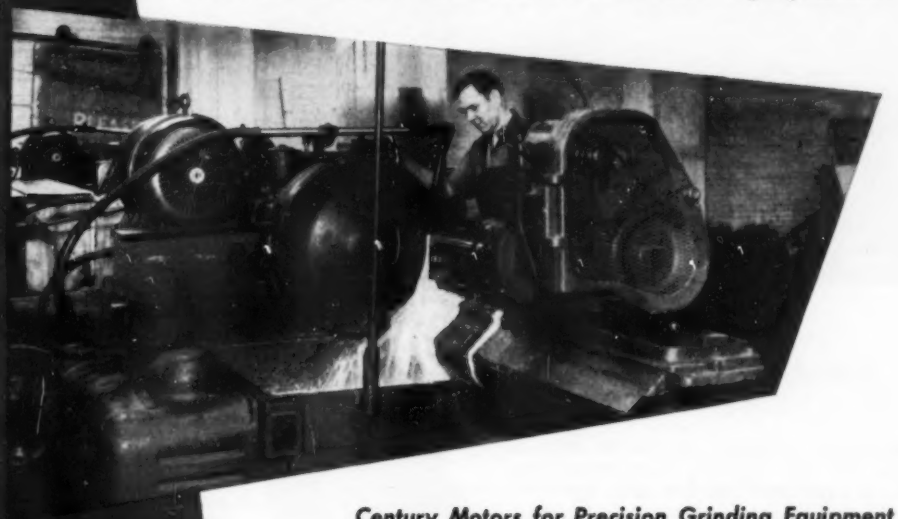

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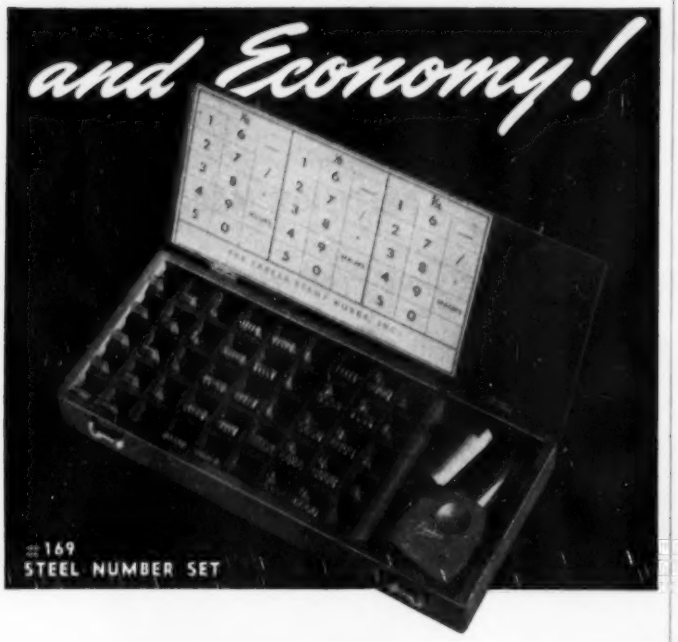

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should be made to find the cause. With slack supervision some of the men might be careless both with the machines and with the work. To keep the machines running a repairman could be available at night and to prevent spoiling the work; proper instruction should be given continuously and especially if new men are hired.

There is no question about the daytime being easier both to the workers and to executives, but this is no excuse why the machines and the work should be handled carelessly at night. To expect the same high production at night as during daytime is a too optimistic conclusion.

To try to improve results on the night shift is none of Al's business unless Brigden has been told to report to him. This is a matter where the superintendent should step in and try to correct.

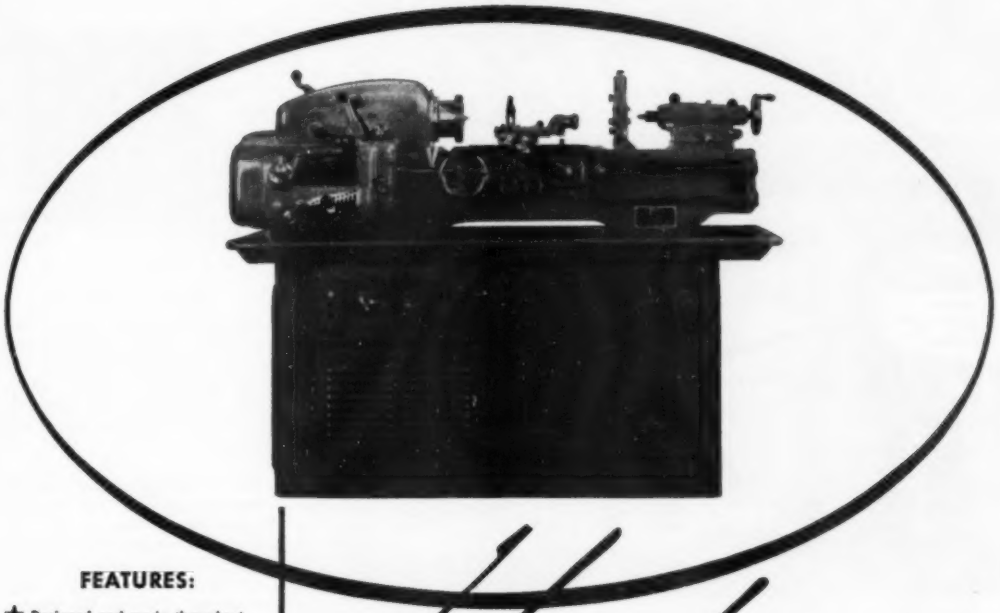
But if Brigden doesn't tell the superintendent about the breakdowns at night Al should approach Brigden first, in a friendly way, to see if the trouble could be straightened out. In case he didn't care Al should ask the superintendent what to do about it.

Under no circumstances should Al accuse Brigden of undue breakdowns on the night-shift. This he would certainly consider an unfair butting in and think he was a sourpuss.

If Al doesn't have a clear view on these points and doesn't know what to do he should study the matter more carefully and try to find out what is best for his company. He could also ask his daytime fellow executives what they think he should do.

I hate to think that Al is trying to trip Brigden so as to prevent him from advancing, but unfortunately this also happens sometimes. If he has that in mind he should be given

"Now that you've just hired me, how about a raise?"



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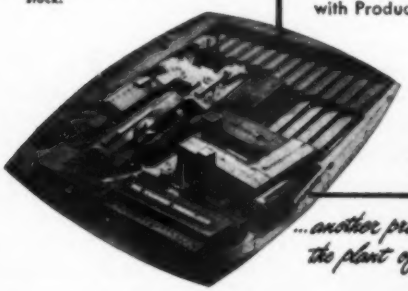

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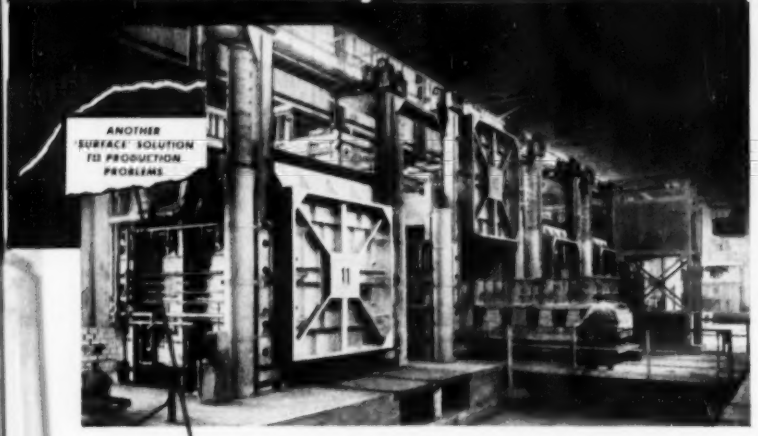

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a severe bawling out by the superintendent, which would probably cure him from further intriguing.

If three shifts are run any length of time, a general foreman should be appointed to coordinate the production. He would then have to work part of his time at night and part of it during regular daytime.

A E Fristedt
Stockholm-Bromma, Sweden

•

FINDER'S FEE

Will establishment of a "finder's fee" policy result in the hiring of men more suited to specific jobs, men spotted and brought around by dependable employees who know the shop's requirements? Or will it lead to pirating?

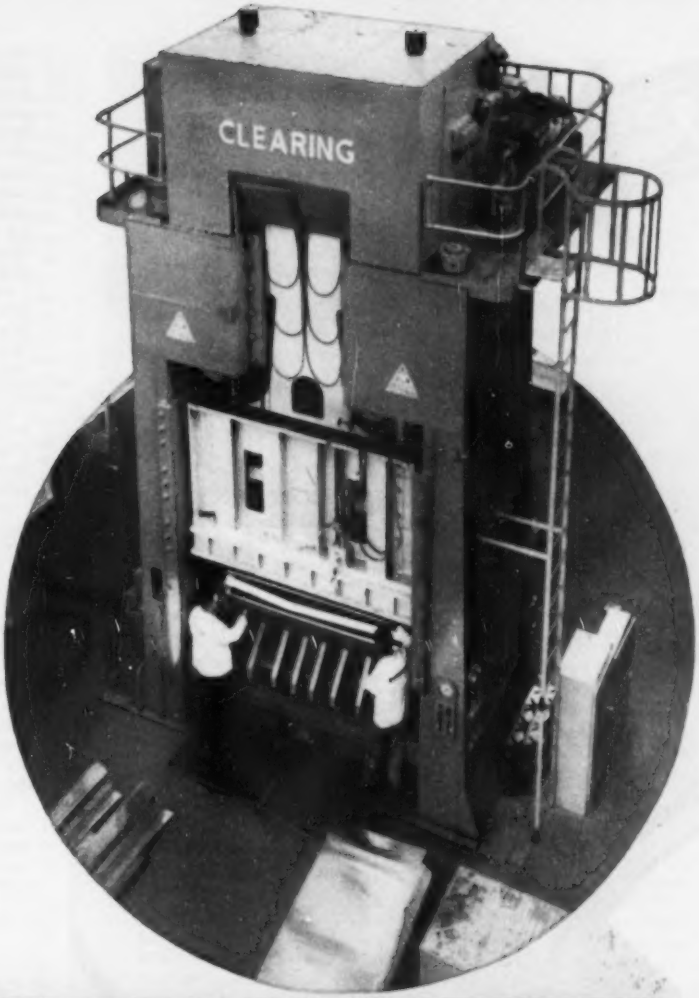
THE IDEA of having a personnel department is not new, but the idea of having a shop man do the preliminary interviewing is not much in vogue, though there have been cases where this has worked out to good advantage in some of the smaller shops where 500 or less are employed.

In plants where a thousand employees are working, it seems to be a necessity to have somebody who can devote his entire time to this work. This party or parties should be free of bias in every way.

Anyone who is in this department should be familiar with the needs of every job in the plant down to the small details.

In one case, a plant, where there were about 400 employees, selected a millwright (who was a thoroughgoing mechanic and had done maintenance work in all departments) to interview applicants for shop jobs.

". . . And now we'll set up a daily production goal—"



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He had been with the concern about twelve years and was a good man for the place, for he was liked by all employees. His manner was such that he could put an applicant immediately at ease and it became noised around among the men in the plant that he was sound and sensible in his talks to strangers. During a period of six years there were very few flops among the men he interviewed and took to foremen for final discussions.

As an incentive to this man, he received a bonus of five dollars in his pay envelope if the man whom he had interviewed stayed four months, and it may be said that his losses of bonus were very few.

Later, the firm absorbed a small competitor of 200 men and it was considered wise to form a personnel department with this man as its head.

In a small shop where there is no regular routine for hiring workers, a foreman may approach one or more of his men with "Say, Bill, do you know of a good man who can run our big planer (or some other machine) and who knows his business, etc," and if Bill doesn't know such a man, he tries to locate one.

During these days of high taxes, any man likes to make a little extra money, and if some arrangement is made whereby he can do a good turn for his employers, he will appreciate the opportunity.

Yes, a fee for obtaining more or extra help will keep men on their toes, and they will be looking for good men to be placed where they are needed.

F H Stebbins
Worcester, NY

•

ALCOHOLICS FORALLEVUS

Is it possible to enforce a rule against daily use of alcohol by plant workers? Is it practical, particularly if a man's work is not affected by such use, and enforcement may result in the loss of a good worker? Readers think . . .

I HAVE ALWAYS been of the opinion that a man's personal habits are strictly his own affair, as long as they are not allowed to offend or infringe on the rights of his fellow man. When these habits begin to constitute a hazard or a distinct annoyance to other people in the immediate vicinity, then obviously it is time for someone in authority to step in and remedy the situation. But in doing so a certain amount of tact must be exercised.

In the case under discussion, the foreman cannot allow his personal

feelings to enter into the matter, any more than a judge on the bench can rule against a defendant because he has a hangdog look or happens to be wearing a particularly loud necktie.

Each case must be judged according to the evidence at hand, showing partiality to no one. Viewed objectively, Reynolds is a good mechanic. As a foreman, then, I would say he is a distinct asset to the shop, despite his partiality for "hard likker." On the other side of the ledger, however, there are two complaints against him, or rather two complainants, who object to brother Reynolds on olfactory grounds; not, mark you, because he borrows their money or steals their tools, but simply and solely because the odor of Old Grandpop which he disseminates rises above the scent of cutting oil and hot bearings and offends their nostrils!

In the not-so-oldtime shops that I remember, such a complaint — along with the complainants — would have been laughed out of court, but the modern foreman has to be a Daniel come to judgment, among other things. So he does one of three things: gets rid of Reynolds, or the lads with the delicate air, or moves the offender to a part of the shop where the air conditioning circulates more freely or his shopmates are (1) less discriminating in their nasal preferences, being more partial to Old Grandpop than Chanel #5; (2) sufferers from chronic congestion of the nasal passages, with consequent inability to smell; (3) just ordinary individuals who don't give a hoot how a man smells so long as he acts and behaves like a man.

In the last analysis, the foreman has to determine what a man is worth to the company, no matter what his habits may be; if alcohol or any other habit makes him a poor employment risk, then the remedy is obvious and should be applied.

Robert S Alexander
Greenville, RI

•

THERE IS NOTHING more annoying to me than the odor coming from one who is saturated with liquor or cigarette smoke. I know that I am not alone in this feeling. Unfortunately we have to take the bitter with the sweet in this life and resign ourselves to overlook some of the things and make the best of it.

I'm going to advise a rule for drinkers: *Don't take any more than your system can absorb without spreading through the pores.* It may seem strange to think that anyone

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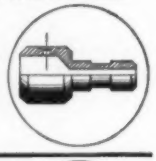

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Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
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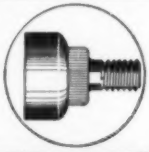
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



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can perform his work at all when logged up to the hilt, but I know of many instances where persons could not do their work at all unless they had a couple of drinks tucked beneath their belts. A friend of mine, who boarded at our house, was what was known in the old days as a "fitter." Billy couldn't chip at all without taking a few painful swipes at his defenseless hand unless he was 0.4375 to 0.6875 shakes to the wind.

This liquor odor that Al complains of is not confined to industry. I've had people come in beside me in church who smelled like the scrapings of an old oak barrel. I had a fellow teacher come up to me at a recent convention who knocked me for a loop. Conventions are frequently the excuse for something like that—but even so!

Getting back to Reynolds—perchance Al can do something to head the guy off before he has to call upon the help of Alcoholics Foralevus.

J Homewood
Ontario, Calif.

NEW BOOKS

METALLURGY FOR ENGINEERS—*By John Wulff, Howard F Taylor, and Amos J Shaler, Dept of Metallurgy, Massachusetts Institute of Technology. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, NY, 624 pages, $6.75*

Written primarily as a textbook for engineering students, this is also intended to serve as a refresher book for practicing engineers who graduated before metals and their fabrication were as much in the academic spotlight as they are today.

The first half of the book explains the concepts and principles that underlie metal processing from ingots to finished article. The second half deals with the processes themselves. Beginning with an introduction to engineering metals, the structure and properties of metals, alloy systems, and industrial non-ferrous alloys, the text covers heat treatment of steel, electrical and magnetic properties of metals, corrosion, and then goes into casting, powder metallurgy, welding, metal cutting, and other processes.

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summary of the most important points; a list of definitions of words, terms, and concepts covered, a group of questions; and finally, a list of references to books containing more information on certain topics covered in the chapter.

•

ESSENTIALS OF GENERAL SPEECH—*By A. Craig Bard, professor of speech, State University of Iowa, and Franklin H. Knower, the Ohio State University. Published by McGraw-Hill Book Co., Inc., 330 West 42 St, New York 36, NY. 253 pages 6x9. Price* $3.

This new addition to the McGraw-Hill Series in Speech, while written specifically for college courses in general speech education which require a short text, is also useful for shopmen. The book is based on three principles. First, speech is a process of social activity; it is studied to develop more effective and satisfactory social behavior. Second, the development of speech skill is a product of effective methods of learning. The best method of learning being that which combines growth of insight, attitudes, and skills. Third, speech is a process of manipulating ideas. These basic principles have been stressed to provide a text from which maximum value can be achieved in a students' first course in speech.

Most of the exercise material from "General Speech: An Introduction" by the same authors has been retained. They are included to permit the instructor to make maximum adaptation to individual differences. Special features of the book include a correlation of psychological and rhetorical approaches to the beginning course. It emphasizes the teaching of speech in general education programs and takes into consideration educational and social psychology, self-confidence, personality, adaptation to the audience, listening, informative speaking and pursuasion.

•

BOLT, NUT AND RIVET STANDARDS *(Second Edition)—Published by the Industrial Fasteners Institute, 3648 Euclid Ave., Cleveland 15, Ohio. 247 pages. Price,* $3.

A committee of experienced production men and engineers from many plants making fasteners has compiled this volume from American Standards and practices of the industry.

They cancelled their order . . . . and we liked it!

ONE of our good customers ordered a 1500 lb. CECO-DROP, and shortly thereafter cancelled the order.

We don't like cancellations any better than anyone else, but this one we *did* like . . . after we learned the reason for it: In re-assessing their forge shop requirements, they decided they needed, not one 1500 lb., but two 3000 lb. Ceco-Drops, with an eventual goal of a 100% Ceco-Drop Shop.

The trend is definitely toward Ceco-Drops

QUOTATION:

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Write for a copy of Bulletin 11-L-O and learn more about this modern hammer.

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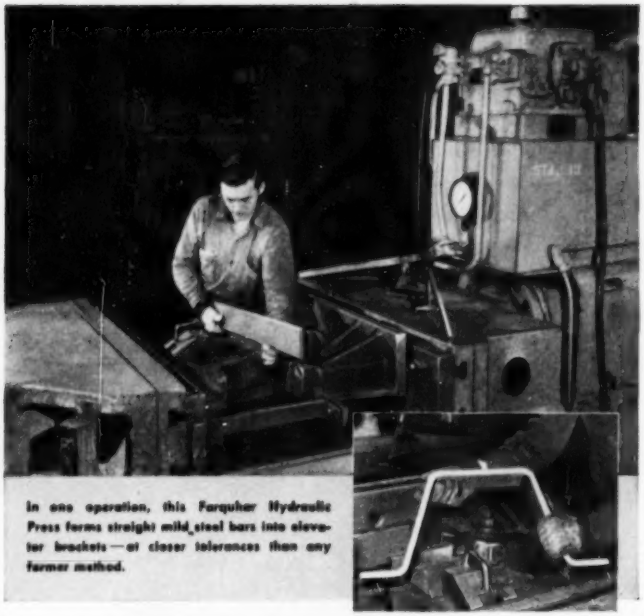

In one operation, this Farquhar Hydraulic Press forms straight mild steel bars into elevator brackets—at closer tolerances than any former method.

OTIS ELEVATOR COMPANY *boosts production, slashes time and labor costs in half, with this*

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In forming lengths of mild steel, the Otis Elevator Company, world's largest elevator and escalator manufacturer, would heat steel and bend it while it was hot. Trying to improve on this system, Otis Production Engineers developed a cold bending process. Farquhar Engineers were contacted, and a 250 Ton "Bulldozer" Horizontal Press was recommended and installed. By bending the steel bars cold in the Bulldozer, Otis has effected a 50% increase in production alone! Time and labor costs have been reduced an estimated 33⅓%! In addition, the Bulldozer operates at closer tolerances than the old heat and bend method. All this, 8 hours a day, 5 days a week, with maintenance costs that Otis terms "negligible."

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Farquhar

HYDRAULIC PRESSES

A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION

in industrial practice that have occurred since the publication of the first edition in 1941.

The book includes square and hexagon bolts and nuts, round-head bolts, track bolts, plow bolts, studs, miscellaneous bolts; slotted and recessed-head screws, socket-head screws, screw threads, small solid rivets, large rivets, weights of products, stock production sizes, terminology and abbreviations.

•

ASTM Standards on Copper and Copper Alloys—*Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 520 pages. Price $4.75.*

All ASTM standards pertaining to copper and copper-base alloy products are brought together in one volume for convenience of users. The 114 specifications and test methods contained in the book cover: plate, sheet, rolled bar and strip; rod, bar and shapes; pipe and tubes; wire; sand and die castings; arc-welding electrodes and brazing solder; standard nominal diameters and cross-sectional areas of American Wire Gage (AWG) sizes of solid round wires used as electrical conductors; stranded conductors and other electrical usages of copper.

•

ASTM Specifications for Steel Piping Materials *(Eighth Edition)—Prepared by Committee A-1 on Steel. 56 Specifications. 384 pages. Published by the American Society for Testing Materials. 1916 Race St., Philadelphia 3, Pa. Price, $3.50.*

The 1952 edition of this compilation contains in their latest approved form (as of late February) the 56 widely used ASTM specifications for carbon-steel and alloy-steel pipe and tubing, including stainless.

Materials covered include: pipe used to convey liquids, vapors and gases at normal and elevated temperatures; still tubes for refinery service; heat exchanger and condenser tubes; boiler, superheater, and miscellaneous tubes. Specifications are included for the materials used in pipe and related installations: castings; forgings and welding fittings; bolts and nuts. The ASTM standard classification of austenite grain size in steels (E 19) with two sets of charts is inserted, also the American Standards covering wrought steel and iron pipe (B36.10) and stainless steel pipe (B36.19).

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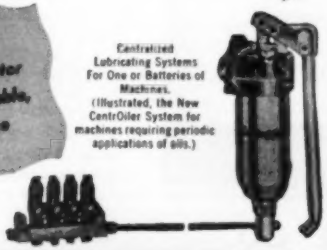

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New specifications cover: seamless and welded steel pipe and tubes for low-temperature service; seamless ferritic alloy steel pipe for high-temperature service; forged or rolled carbon and alloy steel flanges, forged fittings, and valves and parts for low-temperature service; ferritic and austenitic steel castings for high-temperature service; ferritic steel castings for pressure-containing parts suitable for low-temperature service.

Numerous Emergency Alternate Provisions applying to specifications in this compilation have been issued and are furnished with this volume.

•

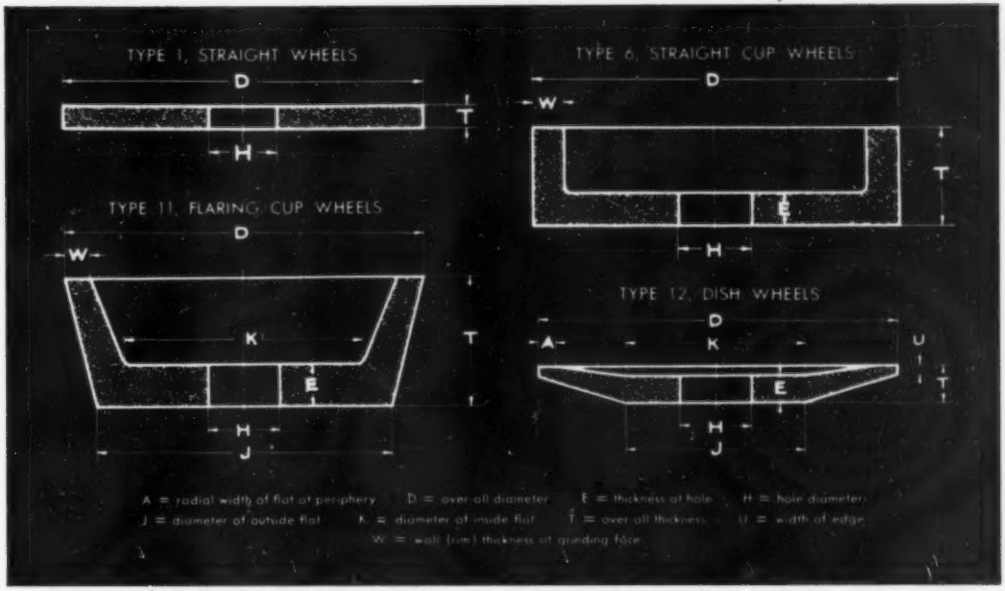
AN OUTLINE OF METALLURGICAL PRACTICE. *Third Edition. By Carle R. Hayward, professor of process metallurgy (emeritus), Massachusetts Institute of Technology. 728 pages. Published by D. Van Nostrand Co. Inc., 250 Fourth Ave., New York 3, N. Y.*

This book was written with two purposes in mind: (1) to provide quick reference data to engineers on the extraction and refining of most metals, and (2) to provide an elementary text for students of metallurgy. In preparing the third edition, the author has dropped smelting and refining processes that have become obsolete in recent years, and has added brief chapters on titanium and uranium. Most of the emphasis is on copper, but other metals discussed are lead, zinc, aluminum, nickel, tin, mercury, antimony, cadmium, beryllium, gold, silver, platinum, chromium, manganese, molybdenum, uranium, zirconium, iron and steel. This book is not intended for the user of the materials in respect to heat-treating, forming or machinability data.

•

STRENGTH OF MATERIALS. *Second Edition. By John W. Brennan, professor of engineering mechanics, Pennsylvania State College. 140 pages. Published by the McGraw-Hill Book Company, 330 West 42nd St., New York 36, N. Y. Priced, $3.*

This is a very simple text designed to provide an understanding of the subject without use of mathematics beyond the level of trigonometry. As such it is suitable for industrial training courses and home study. The new edition is easy to read. Subjects discussed are: stresses, shear, riveted joints, torsion, shear and moment diagrams for beams, stresses in beams, deflections in beams, effects



WHAT ARE STANDARD GRINDING WHEELS? They are the sizes and shapes selected by the National Bureau of Standards on the basis of: (1) widest use by industry; (2) widest range of adaptability to modern grinding equipment; and (3) most commonly carried in manufacturers' and distributors' stocks.

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How standard grinding wheels help you 3 ways

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Please send me my copy of "*STANDARD SHAPES AND SIZES OF GRINDING WHEELS.*"

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When you need the right gear *in a hurry*

It's one thing to get a gear cut exactly to your specifications . . . and another to get it *on time*. To be sure of satisfaction *both* ways, there's only one safe thing to do: specify Grant gears. For, whether you order by 'phone, telegraph or letter, Grant will have just the gear you want on its way in a matter of hours.

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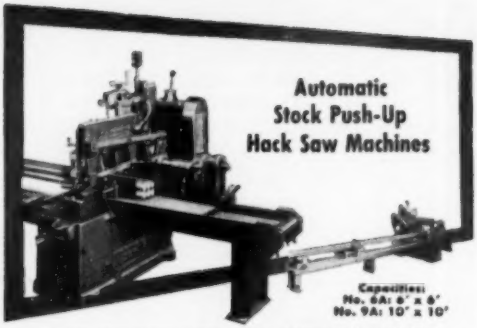

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of eccentric loading, column design and stresses in thin-walled cylinders —welds. Enough information is given so that the student should be able to design and erect safe structures of elementary types.

•

CORROSION TESTING PROCEDURES—*By F A Champion, PhD, ARCS, FIM. Published by John Wiley & Sons Inc, 440 Fourth Ave, New York 16, N. Y. 369 pages. Price $6.25*

Dr Champion has exhaustively covered the methods of making corrosion tests for practical purposes, as distinguished from fundamental research. He covers the preparation of metal and corrosive; the exposure in laboratory, field, or service tests; the cleaning and examination of specimens; and interpretation of results.

An important point, often overlooked, that is made at the very first is that the relative corrosion resistance of metals is likely to vary with the testing conditions. Thus five different metals tested under seven different conditions produced seven different orders of resistance to the same corrodant. To be realistic, the testing procedure must be selected with a view to the intended use of the metal.

The text is annotated with detailed references to sources of information, and should provide a useful reference for those working with corrosion problems.

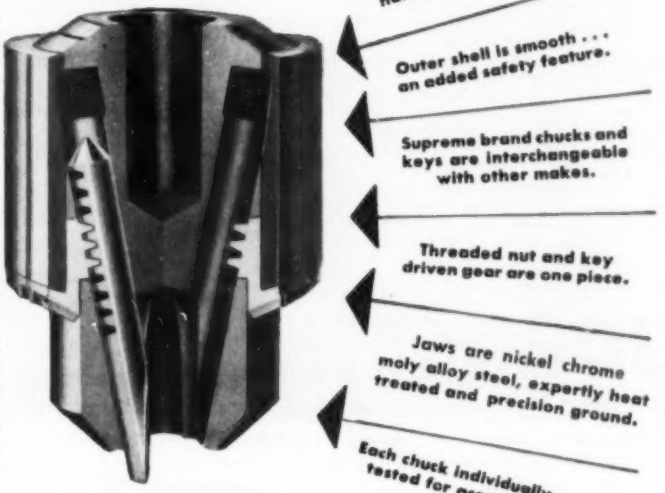
•

INDUSTRIAL FURNACES. VOL 1 (FOURTH EDITION)—*By W Trinks, Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, NY. 526 pages. Price $10.*

Among furnace engineers, the author's two volumes on industrial furnaces are regarded as the standard text. In revising Vol 1, Mr Trink has rewritten about 40% of the material and added 94 illustrations. Chapters are devoted to capacity, fuel economy, heat-saving appliances, durability, and movement of gases in furnaces. New material covers such subjects as high (thermal) head heating, data on thermal conductivity, heat loss through walls of lightweight fire brick, heating by induction, effect of arrangement of stock in the furnace, zone heating, and many other subjects. This book is of course a reference for the furnace designer, but it will give the basic principles to the operator of a number of furnaces so that he may understand them for procurement and operation.

HERE ARE REASONS WHY IT PAYS TO BUY

SUPREME BRAND CHUCKS


Entire chuck body is hardened inside and out.
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Supreme brand chucks and keys are interchangeable with other makes.
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Jaws are nickel chrome moly alloy steel, expertly heat treated and precision ground.
Each chuck individually tested for accuracy.

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Here are facts about the outstanding quality and precision manufacturing of the SUPREME Brand Chuck . . . that make it rugged . . . that make it stand up on the job. Job test it on your own work and you'll experience performance that is most convincing as to its long lasting quality . . . accuracy and dependability.

Check the above features, then prove them to yourself by ordering a supply from your distributor. If you do not find him handling the SUPREME line . . . write direct.

SUPREME BRAND CHUCKS

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Harden, heat treat, temper and anneal with one furnace . . the Johnson No. 706.

Another in the Johnson line of dependable gas equipment has won its place in both large and small shops and plants. Operators like its easy adaptability. Six Johnson Direct Jet Bunsen Burners with individual shut off valves and pilot lights provide steady, easily controlled heat from 500 to 1850° F. Semi-muffled type with burners operating below Carbofrax hearth. Firebox: 7"x 13"x 16½". Also available bench style. Write for complete and factual information.

A smaller version of this highly flexible furnace is the No. 654. Four burners deliver 500 to 1800° F. Firebox: 5" x 7¾" x 13½". Available as pedestal or bench style.

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Johnson No. 706 Pedestal Style	$278.00
Bench Style	$250.00
Johnson No. 654 Pedestal Style	$150.00
Bench Style	$124.00

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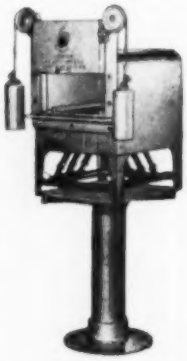

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Pioneers in the development of a practical machine-tool coolant pump, Ruthman has consistently offered you a better pump for your machines.

Totally enclosed drip-proof motors . . . heavy-duty prelubricated ball-bearings . . . electronically balanced rotating assembly, are a few of the many innovations Ruthman has introduced over the years. For the best coolant pump specify Ruthman. Write for catalog today.

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NAMES in the NEWS

•

Carl S Abbott has been appointed vice president and general manager, and **John W Fauver** has been named vice president and sales manager of the J N Fauver Co, Detroit. Mr Abbott was formerly sales manager, and Mr Fauver has been associated with the ordnance department of the company.

W C McCord has been elected president, US Radiator Corp, and **Roland P Place** has been named chairman of the board. Both offices had previously been held by **Wesley J Peoples**, who continues as a director, advisor, and consultant. Mr McCord was formerly president of Southland Life Insurance Co, and Mr Place, president of Michigan Chemical Corp. **Raymond R Harnetiaux**, formerly associated with Fairbanks, Morse & Co, has been named manager, Warm Air Furnace Div of US Radiator.

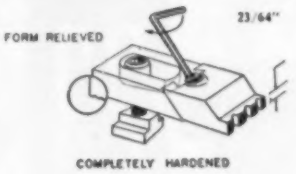
James A Currie has been appointed vice president and general manager, Erie Foundry Co, and **Macdonald S Reed** has been named vice president and chief engineer.

D G Clark has been appointed assistant general sales manager of Firth Sterling, Inc. Associated with the company since 1903, Mr Clark has served as vice president in charge of sales, and most recently as steel sales manager. **E William Kalb**, formerly assistant, succeeds Mr Clark as manager.

Ralph M Watson

Ralph M Watson has been named director of Research for Worthington Corp, succeeding **Paul Diserens**, retired. Associated with the organization since 1936, Mr Watson has most recently served as assistant to the vice president in charge of engineering.

J & S "ALL PURPOSE" JAW CLAMPS
will speed up your production time
The clamp you can't afford to be without



ELIMINATE—U-clamps—straps and fingers on lathes—planers—milling machines—boring millers and drill presses—ALSO ELIMINATE in most cases—4-jaw chucks—vises and special fixtures.

FEATURES:—Powerful grip—no slipping—rapid loading and unloading.

EASILY ADAPTED TO JIGS AND BOX FIXTURES

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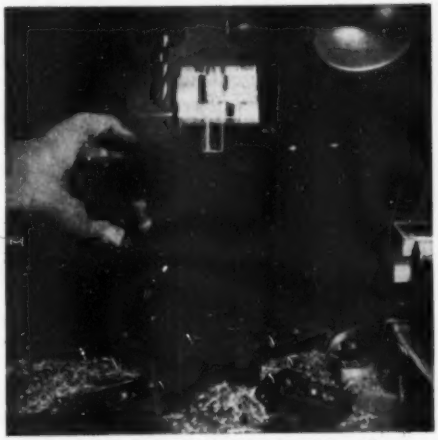
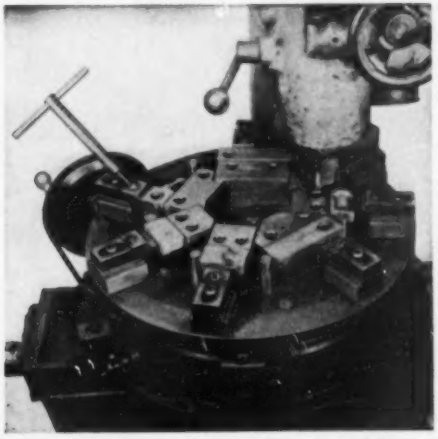
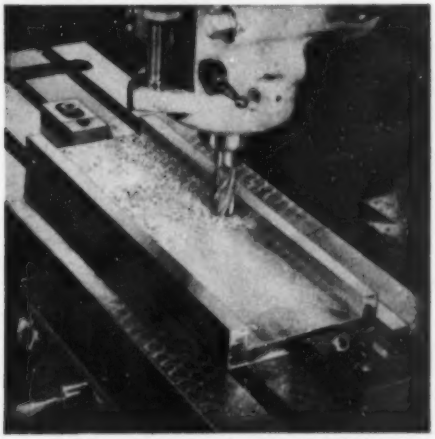


Test piece as demonstrated at A.S.T.E. Tool Show, Phila., Pa. April, 1950—showing powerful grip of clamps using ¾" cutter—steel is 2" x 3" x 14" high. Standard clamp being used.



Production milling—motorized turn-table on miller—2½ R.P.M., 7 stations—has enabled this manufacturer to increase his production 5 times. Standard clamp being used.

Typical lathe application. Workpiece removed by simply loosening one screw in each of two adjoining clamps. NO RE-POSITIONING NECESSARY for next piece. Standard clamp being used.



Typical milling application, workpiece removed by simply loosening one set screw of one clamp only. NO RE-POSITIONING NECESSARY for re-loading. Workpiece is 1¼" x 5" x 14" long. Standard clamp.

Fastest, simplest—workpieces held rigidly. Less obstruction, no slipping, because a 1/16" *tapered slot insures firm grip.* Also, angle of jaw travel is 45° to plane of the face plate or table. As the screw is tightened, the jaw forces the workpiece down against the machine surface—*across* against the opposite clamp—this grip is *stronger than that* provided by *eight* U-clamps! Allows overall machining to within ⅛" of the machine's working surface! Available in types and sizes to suit all applications. "T"-nuts furnished to fit all standard machines.

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WRITE FOR NEW FOLDER!

—contains complete details on advantages, applications, types and sizes available.

J&S TOOL CO., INC.

Booklet describing J & S "Fluidmotion" Wheel Dressers, etc., also sent on request.

Fig. 1

23 MEEHANITE Castings in this HiDUTY Lift Truck

TRANSITIER Truck Co., Portland, Oregon, specify 23 important cast components in their line of HiDuty Lift Trucks (Fig. 1) in Meehanite metal. The importance of these parts is further emphasized by the fact that in recent months a number of them have been redesigned from original steel and bronze specifications. In addition to the ones shown, the following parts are Meehanite castings:

1. WHEEL SPACER
2. HYDRAULIC VALVE BODIES(2)*
3. CLUTCH DRIVEN PLATE
4. CLUTCH SUPPORT
5. TRANSMISSION CASE
6. BRAKE DRUM
7. WHEEL HUB(1)*
8. HYDRAULIC CYLINDER PACKING NUT (2)*

In addition to similar parts shown.

The design and specification of these components is a good example of the beneficial results of team work between a foundry manufacturing high property, high quality castings, and a manufacturer alert to the possibilities of incorporating dependability into his product through proper specification. The use of Meehanite castings provides a sure knowledge that both service and production requirements will be met regularly and repeatedly.

Write for our new Bulletin 35 "Meehanite Castings Serve all Industry."

Take *YOUR* Casting Problem To A MEEHANITE FOUNDRY

American Brake Shoe Co.	Mahwah, New Jersey
The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry	Providence, Rhode Island
Compton Foundry	Compton, Calif.
Continental Gin Co.	Birmingham, Alabama
Crawford & Doherty Foundry Co.	Portland, Oregon
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
Empire Pattern & Foundry Co.	Tulsa, Oklahoma
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Hardinge Company, Inc.	New York, New York
Hardinge Manufacturing Co.	York, Pennsylvania
Johnstone Foundries, Inc.	Grove City, Pennsylvania
Kanawha Manufacturing Co.	Charleston, West Virginia
Lincoln Foundry Corp.	Los Angeles, California
E. Long Ltd.	Orillia, Ontario
Otis Elevator Co., Ltd.	Hamilton, Ontario
The Henry Perkins Co.	Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
Ross-Meehan Foundries	Chattanooga, Tennessee
Shenango-Penn Mold Co.	Dover, Ohio
Sonith Industries, Inc.	Indianapolis, Ind.
Standard Foundry Co.	Worcester, Massachusetts
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Traylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Warren Foundry & Pipe Corporation	Phillipsburg, New Jersey

"This advertisement sponsored by foundries listed above."

MEEHANITE® NEW ROCHELLE, N. Y.

H B Phillips has been appointed sales manager, Quantity Sales Div, Cutler-Hammer, Inc, Milwaukee. **F A Wright** has been named sales manager, District Sales, and **J M Cook** is new sales manager, Industrial Control Div. Mr Phillips was formerly head of appliance sales; Mr Wright served as assistant general sales manager, and Mr Cook has most recently been manager of the San Francisco district sales office and plant.

M C Peterson has been named manager of national account sales, Warner Electric Brake & Clutch Co, Beloit, Wis. Prior to joining the organization a year ago as Chicago district manager, Mr Peterson served as division sales manager for Willys Overland Motors, and as vice president, Flex-O-Tube Co.

H Dean Valentine has been named assistant sales manager, Moore Products, Philadelphia. Mr Moore joined the organization in 1945, and has recently acted as sales engineer for the Philadelphia-Wilmington territory.

George J Zipf has been appointed district manager in charge of sales and service for the Chicago district of Raytheon Mfgr Co. A member of the organization since 1944, Mr Zipf has most recently served as sales engineer for the New York district.

D K Tasker has been appointed executive assistant to the vice president and assistant general manager of Republic Aviation Corp. Mr. Tasker has been managing the company's experimental and test flight activities at the USAF test base at Muroc, Calif., for the past three years.

George H Sanborn has been named sales manager, Fellows Gear Shaper Co, Springfield, Vt. Formerly Detroit district manager and chief field engineer, Mr Sanborn succeeds **Leroy C King**, who has retired after 41 years with the firm.

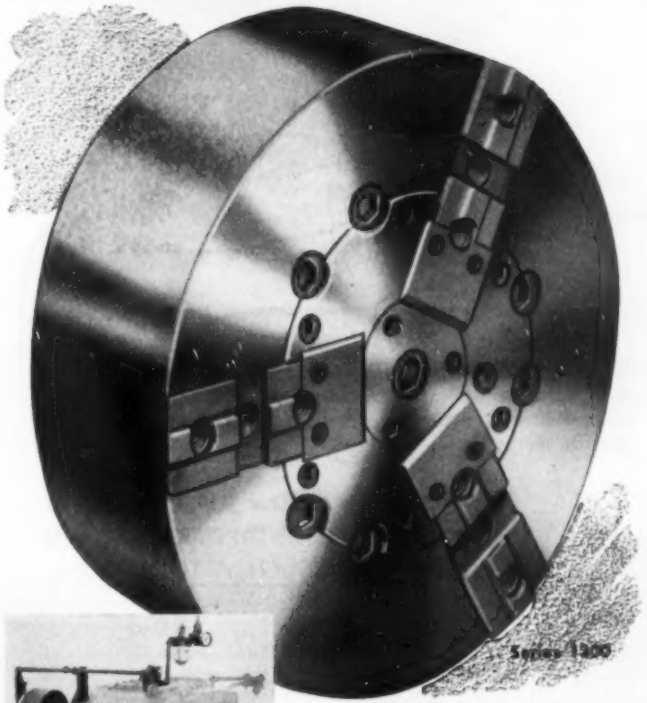
Conrad R Seim has joined Montague-Harris & Co as assistant sales manager in the machine tool division. Prior to joining the organization, Mr Seim was associated with Kennametal, Inc, specializing in tooling of production machinery.

J O Tompkins has been appointed assistant chief metallurgist, Keystone Steel & Wire Co, Peoria, Ill. **Harold Fales** has been named wire mill metallurgist for the company.

SKINNER CHUCKS HAVE

POWER

TO PUSH PRODUCTION!



Write for catalog giving complete details on the Skinner line of power and manually operated chucks. And ask about new movie "Chucks and Their Uses" — available for free showings.

THE CREST OF QUALITY

THE SKINNER CHUCK CO.

343 Church Street, New Britain Connecticut

The Skinner line of power chucks and power chucking equipment has the strength, rigidity and design features so essential for today's production needs. Chucks are available from 6" to 21" with forged steel bodies, and with either 2 or 3 adjustable or non-adjustable jaws. Exclusive sliding wedge construction grips internal or external work positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates the draw bar. Skinner double acting rotating and non-rotating air cylinders are available for all sizes of Skinner power chucks, and for actuating all types of holding fixtures and tailstocks. Other Skinner accessories include hand operating valves —complete air unit including regulating valve, pressure gage and lubricator— filters — soft blank top jaws; draw bars —draw tubes, etc.

It's a Hamilton

INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE *IS SUCH A TOOL!*

The complete story of this machine is told in our Bulletin T-471.

IT'S FREE. ASK FOR IT!

THE *Hamilton* TOOL COMPANY
810 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

Rodney V Nilsson has been appointed manager of tin plate sales for Youngstown Sheet & Tube Co. **R Paul Broadhurst** has been named assistant district sales manager for the Chicago territory. **David W Martin** succeeds the late **William Walton Ford** as district sales manager in charge of the Atlanta office of the firm.

Theodore H Brain has been appointed manager of the Mechanical Equipment Div, Ditto, Inc, Chicago. Mr. Brain was formerly associated with Foote Brothers Gear & Machine Co, and American Steel & Wire Co.

Keith P Rindfleisch has been appointed sales vice president of US Steel Supply Div. Mr Rindfleisch, Chicago district manager for the past year, formerly served in the same capacity in Pittsburgh. He will be succeeded by **Hal P Kibbey**, formerly assistant district manager.

L. J. Campbell has been appointed president of Firestone Steel Products Co, subsidiary of Firestone Tire & Rubber. A member of the organization since 1942, Mr. Campbell served as controller of Steel Products from 1944 to 1950, and for the past two years has been vice president.

Theodore Ray Patrick has been named general manager of Chrysler Corp's Highland Park Plant, succeeding **H. R. Matheny**, who has retired as vice president and general manager. Mr. Patrick had been serving as operating manager for the past year. **Leslie Touluse** has been appointed plant manager of the Amplex Plant, Detroit.

Walter M. Hanneman has been appointed executive engineer for all standard products of Shakeproof Inc Div, Illinois Tool Works. Associated with the organization for more than 20 years, Mr. Hanneman will make his headquarters at the Elgin, Ill. plant. **Carl F. Jensen**, formerly central district sales manager, has been named manager of a new Special Stampings Dept for Shakeproof. Appointed as special service engineers in the dept: **O. J. Poupitch**, automotive industry; **F. K. Knohl**, appliance industry; **V. A. Hedlund**, electronics. **Charles F. Keyser**, formerly manager of distributor sales, has been named central district sales manager, succeeding Mr. Jensen. **William B. Denniston** has taken over Mr. Keyser's post.

Yale & Towne saved almost 5¢ a pound

ON THIS EXTRUDED PADLOCK SHAPE

Saving metal and machining time by using an extruded brass shape isn't exactly news. But this was a little different . . . Yale & Towne, a large consumer of Anaconda Metals, was already using an extruded shape for its line of solid brass pin-tumbler padlocks . . . and paying an extra 4.8¢ a pound for a finish-draw operation.

Our Extrusion Department thought a die could be designed to eliminate the extra draw, retaining the exacting dimensional tolerances and surface finish. It worked. Beautifully! And in case you're interested in dollars-and-cents savings, so far the number of pounds of this shape supplied runs into a stout six figures!

You'll find, too, that quality goes up while costs come down when you switch to extruded shapes, because extruded metal is *wrought* metal . . . tough, strong, dense-grained, smooth-surfaced and easy to machine. Anaconda Extruded Shapes are available in long mill lengths; in copper, brass, bronze and nickel silver. We'll be glad to make suggestions based on your sketch or sample. Address The American Brass Company, General Offices, Waterbury 20, Connecticut.

Here is shown the Anaconda Extruded Shape from which padlock body blanks are sawed. Views above indicate the extent of machining necessary in the Yale & Towne Solid Brass Pin-Tumbler Padlock.

Five of the dozen-odd Anaconda Extruded Shapes used by Yale & Towne to build lasting dependability into its top-quality, moderately-priced products.

ANACONDA

EXTRUDED SHAPES

a short-cut to a finished product

Formbrite reports on its First Birthday

. . . and already proves a big help in Yale & Towne's polishing room

Just about a year ago a newcomer to the family of Anaconda Metals was announced to the trade—Formbrite* Drawing Brass—a metal with a superfine grain structure that permits polishing to a more lustrous finish in far less time than ordinarily possible.

In the form of sheet or strip, Formbrite is stronger, "springier," harder and more resistant to scratching and abrasion—yet is so ductile that it readily withstands deep-forming operations and takes clean-cut die impressions.

Illustrated here are several doorknob components made of Formbrite by Yale & Towne, one of the nation's most important manufacturers of builders' hardware. These parts are brought to a high finish on automatic polishing machines, then are lacquered or chromium plated.

In the short space of a year The American Brass Company has produced millions of pounds of Formbrite which was fabricated by leading manufacturers into a wide variety of products. Each, in substance, makes the same report: "substantial savings in our polishing operations."

Formbrite is produced, at no increase in price, in the form of sheet and strip for pressroom work; also in rod and wire for cold heading operations. Write for Publication B-39, addressing The American Brass Company, General Offices, Waterbury 20, Connecticut.

*Reg. U.S. Pat. Off.

In the bullseye is shown one type of Yale & Towne doorknob assembly. Above are several of the progressive steps in producing the knob shank (note the extent of metal deformation at the deep recess). Knob, at right, receives one draw and is chamfered on the edge. Knob is formed and assembled to shank in one press stroke. Shank, knob and rose at left are made of Formbrite—the metal that helps polish itself.

Formbrite Drawing Brass is an

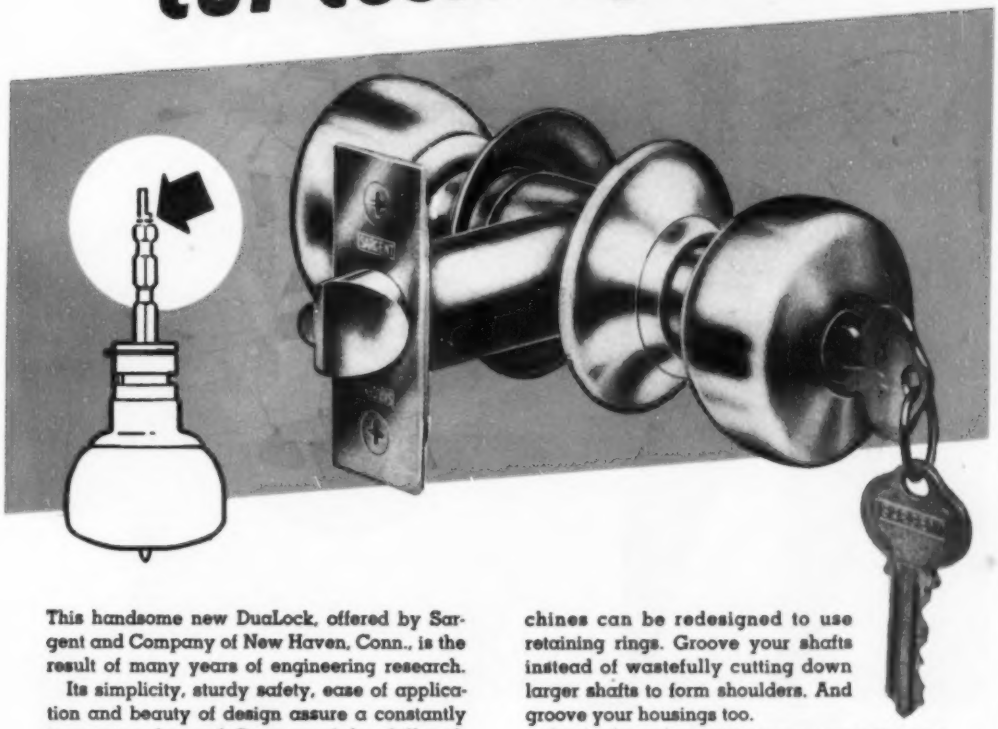
ANACONDA

PRODUCT

made by THE AMERICAN BRASS COMPANY

National Retaining Rings

cut costs again!



This handsome new DuaLock, offered by Sargent and Company of New Haven, Conn., is the result of many years of engineering research.

Its simplicity, sturdy safety, ease of application and beauty of design assure a constantly increasing demand. Because of the skill with which fine precision parts are built into this greatly simplified lock it requires only an exceptionally small cross bore.

By using National retaining rings Sargent saves material, weight, space and assembly time—without sacrificing efficiency or strength.

Examine your products—metal, wooden or plastic. Many products as well as many machines can be redesigned to use retaining rings. Groove your shafts instead of wastefully cutting down larger shafts to form shoulders. And groove your housings too.

Our high grade steel rings assure greater savings and greater margin of profit.

Let us show you how retaining rings can do an efficient job for you. These inexpensive, efficient artificial shoulders save time, save weight, save space, save materials, save money.

Write today for descriptive folder of many types of National retaining rings.

THE NATIONAL LOCK WASHER CO.

NEWARK 5, N. J. **MILWAUKEE 2, WISCONSIN**

Practical Assistance

Whether it's a tight squeeze in a cookie jar or a bottleneck on your production line . . . practical assistance—the kind that solves the problem simply and fast—is your best answer. And ***PRACTICAL TECHNICAL ASSISTANCE*** is a *Cities Service specialty.*

Cities Service Lubrication Engineers can offer *practical assistance* that will eliminate bottlenecks caused by faulty lubrication . . . will mean dollars, man-hours and equipment saved. They're specialists in the industry's most effective lubricating practices. In addition, they offer the most complete line of Cities Service quality lubricants.

but check for yourself:

✔ Check on the high quality of all Cities Service lubricants. Ask critical users. Or better still, test them on the job.

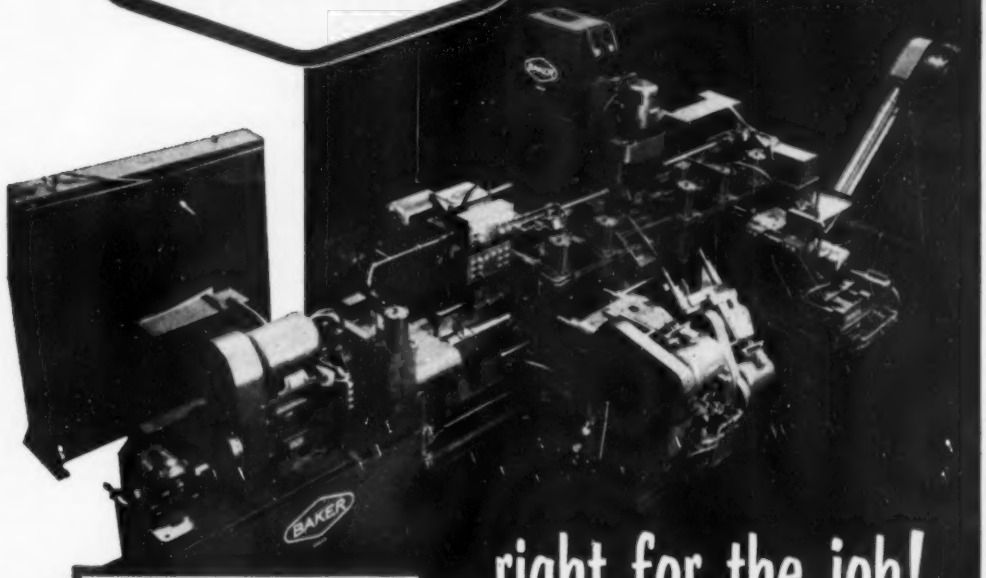
✔ Check the complete Cities Service line for the correct lubricant for every need. Deliveries are quick—and dependable.

✔ And finally, discuss your problems with a Cities Service Lubrication Engineer . . . he's probably solved many like them for other machine operations. Write or phone CITIES SERVICE OIL COMPANY, Dept. H-37, Sixty Wall Tower, New York City 5 . . . or get in touch with the office nearest you.

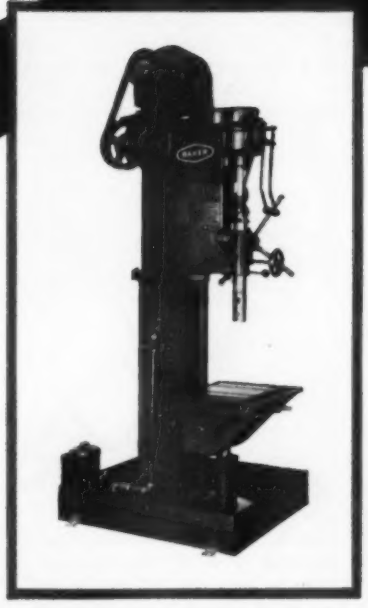
CITIES SERVICE

WHETHER LIGHT or HEAVY..
STANDARD or SPECIAL

BAKER has the drill..



..right for the job!



Regardless of the job requirement, Baker engineers have the know-how to provide drilling machines that will do the job better! Where production figures are of primary importance, Baker will greatly increase productivity . . . and for standard drills over inch and a half capacity . . . there's a Baker *right for every job.* Consult Baker for better drilling machines, no obligation . . . and there is a qualified Baker Sales and Service Representative nearby who is eager to give you prompt and efficient service.

BAKER BROTHERS, INC. Toledo, Ohio
DRILLING... TAPPING... KEYSEATING and CONTOUR GRINDING MACHINES

"We standardized on SKIL Tools because they consistently out-performed all others!"

—says **J. L. Pettit,** plant manager,
METALWASH MACHINERY CORPORATION, Elizabeth, New Jersey

"The bulk of Metalwash Machinery Corporation's production of pickling, degreasing and drying machines now goes to defense industries," says Mr. Pettit. "Under present conditions," he continues, "we are working at full capacity on heavy machinery, work that asks the *most* of portable grinding and drilling tools.

"Years ago, we found SKIL tools out-performed *other* brands. Saved man hours through durable performance. Saved valuable materials through the most efficient operation and accurate performance of all the tools we tried!

"And," this plant manager observes, "we find it *far* easier to plan a production schedule when we *know* all drilling and grinding problems will be solved easily with SKIL tools because we've *proved* by experience they are *production* tools.

"It's easy to see why we've standardized on these rugged top quality tools."

Thomas Fitzsimmons uses a ⅜" SKIL Drill with a 1" hole saw. He stresses, "SKIL Drills have plenty of guts. Drilling in steel hour after hour is a tough job, but these SKIL Drills deliver top performance, day after day!"

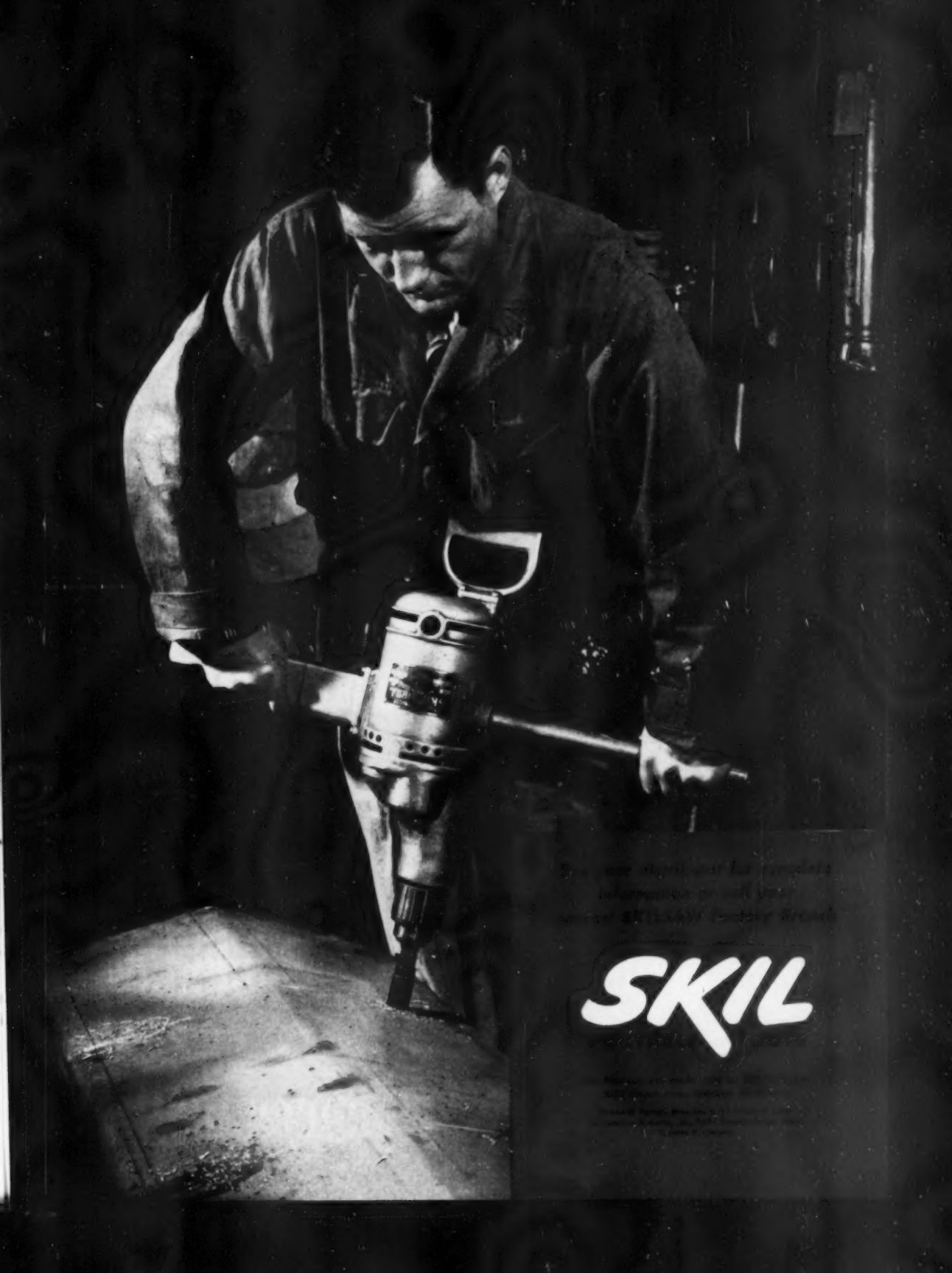
Thomas Petroski is using the Model 13 SKIL Disc Sander with a cup grinding wheel to smooth a weld seam on an air-washer (designed to remove acids and other impurities from air). He states, "I get my job done *faster* and *better* with a SKIL Disc Sander because it has plenty of speed and reserve power for this heavy work."

SKIL Disc Sander
Model 13

Heavy duty. Capacity: 9" backing pad and disc; 6" wire cup brush or 5" cup grinding wheel. Spindle diameter: ⅝"—11 thread. Speed: 4200 r.p.m., no-load. Length over-all: 18", not including pad. Net weight: 14¼ lbs.

SKIL Drill
Model 2103

Heavy duty ⅜" drill. Capacity in steel: ⅛" to ⅜". Capacity in hardwood: ⅛" to 1½". No-load speed: 450 r.p.m. 1000 r.p.m. at extra cost. Full-load speed: 275 r.p.m. standard. Length over-all: 16⅛". Net weight: 14¼ lbs.


SKIL

TAPPING 37 HOLES SIMULTANEOUSLY IN REO "GOLD COMET" CYLINDER HEAD. PRODUCTION:—65 HEADS, OR 2405 HOLES TAPPED PER HOUR WITH BAUSH SPECIAL MULTI-WAY INDIVIDUAL LEADSCREW TAPPING MACHINE.

All holes in manifold side — spark plug side and top side, as well as all spark plug holes, are tapped by the two (2) horizontal, and (1) vertical and one (1) vertical-angular tapping heads.

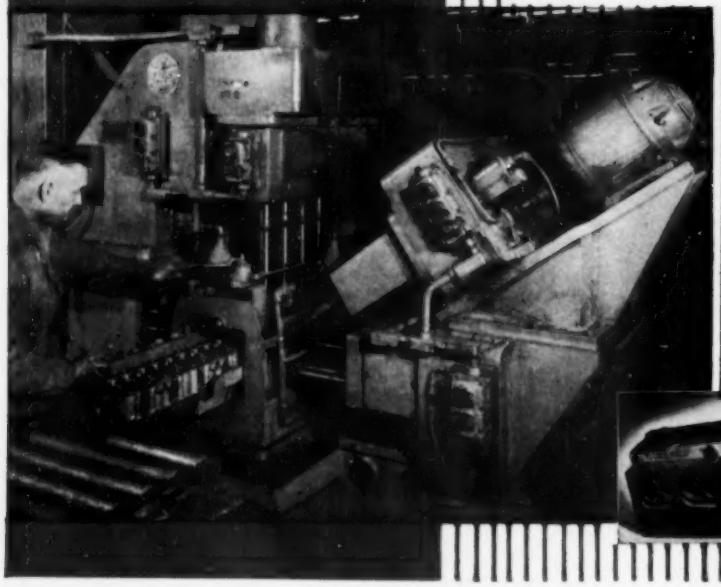
Single position holding fixture holds one (1) cylinder head. Part is manually pushed into position on rails and is located by two (2) dowels in locating holes previously machined in head.

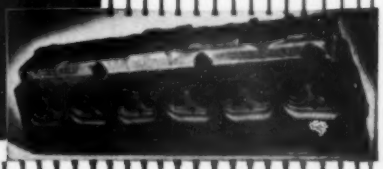
Work is air-clamped in position by hand-operated valve and 37 holes tapped as follows:

Tap twelve (12) holes in Manifold Face—
Tap fourteen (14) holes in Spark Plug Face—
Tap five (5) holes in Top Face—
Tap six (6) Spark Plug holes.

Completing 65 Cylinder Heads per hour.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS





Close-up photo of — — REO "GOLD COMET" CYLINDER HEAD — in which various tapping operations are performed.

Strain your fluids with Cuno AUTO-KLEAN—the only strainer you can "comb clean" while it's working. Exclusive "comb-action" cleaning—*periodically* by hand . . . or *continuously* by automatic means. No need to stop flow. *Guaranteed* to remove 100% of all solids larger than specified.

CUNO

Fluid Conditioning

Removes More Sizes of Solids from More Kinds of Fluids

Strain fuels, lubricants, process fluids, etc.—AUTO-KLEAN
Filter fuels, lubricants, process fluids, etc.—MICRO-KLEAN
Clean raw water, recirculating water, etc.—FLO-KLEAN

A Lot of Dependability in a Small Package

Thousands of industrial firms recognize the Cuno AUTO-KLEAN disc-type strainer as an indication of *protection* on lube and hydraulic systems.

They know the machine builder has provided the best means of keeping fluids *clean* . . . when he has installed the AUTO-KLEAN as standard equipment.

They appreciate, too, the ease with which the AUTO-KLEAN works. A turn of a handle—periodically by hand or continuously by automatic means—is all that is necessary to keep the strainer *itself* clean. This is done without stopping flow. And there's nothing to replace or renew.

They also know that the AUTO-KLEAN is *guaranteed* to remove 100% of the solids larger than specified*. . . with minimum pressure drop.

The Favorite of Designers

The Cuno AUTO-KLEAN solves other problems *right on the board.*

It's compact. A single unit handling full flow (from a few to more than 4000 gpm) occupies no more space than the usual partial-flow type.

You can build it in—or mount it externally. Inlet and outlet can be in any position. You can install it on low pressure or gravity feed or suction with no loss of efficiency.

And you can depend upon it lasting as long as the equipment on which it is installed because it is all-metal and non-collapsible and can be made of a wide range of materials for various fluids, viscosities, temperatures and solids to be handled.

*Available spacings from .0035 in. to .062 in.

Cuno Engineering Corporation
Dept. 2418, South Vine St., Meriden, Conn.

Please send information on Cuno AUTO-KLEAN

for .....

Name .....

Company .....

Address .....

City .....Zone....State....

Please attach to business letterhead

Gaging Costs Less

with a TAFT-PEIRCE CompAIRator AIR GAGE

It's FASTER

A Taft-Peirce CompAIRator reads instantaneously to .0001" or less . . . without mechanical contact . . . without flutter or creep. There's virtually no time lag even when gaging at considerable distance from unit.

It's More VERSATILE

Ideal for any type of production measurement from simple diameters to complex multi-dimensional checks. Supersensitive, it can be used in checking alignment, flatness, concentricities, squareness of bore to face, center distances, and tapers.

It's More ECONOMICAL

Eliminates wear of gaging members . . . saves constant checking and replacement. Little or no maintenance is required.

It's SIMPLE

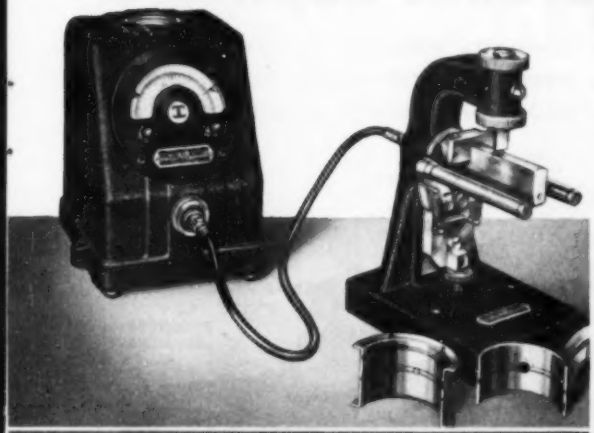
Anyone who can read a dial can operate a T-P CompAIRator. What's more, it's portable, easy to adjust, and can be equipped with any one of several standard dials and amplifications.

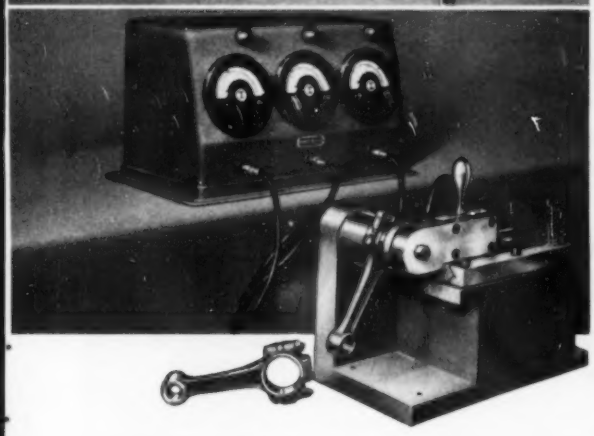
It's DEPENDABLE

Vibration, jarring, tilting will not disturb accuracy . . . nor will sludge or coolant flow —air pressure automatically clears gaging area.

Write today for Bulletin

T-P Single Dial CompAIRator
checking wall thickness of bearing liners. Special fixture adjusts to check range of bearing sizes.



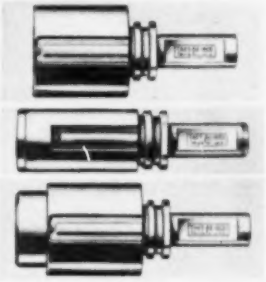


T-P Triple Dial CompAIRator
measures face squareness (to hole), hole size, and face width of connecting rod, in one pass.

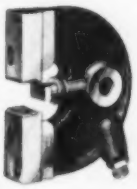
Standard Accessories

T-P HORIZONTAL STANDS. Excellent for bench inspection or use with large plugs, they facilitate gaging at a distance from indicator.

T-P VERTICAL STANDS speed measurements in vertical plane. Special fixtures are designed and built on request.



T-P GAGE PLUGS
available for thru holes, blind holes, and counterbores, from .055" D upward. Also with Emmerton, bullet-nose, or Taft-Peirce pilots.



T-P AIR GAGE RINGS for external diameters .125" up. Available with 3 nozzles instead of 2 for centerless ground work.

T-P ADJUSTABLE AIR SNAP GAGES available in range from .125" to 6¾". Anvils have ⅜" range of adjustment.

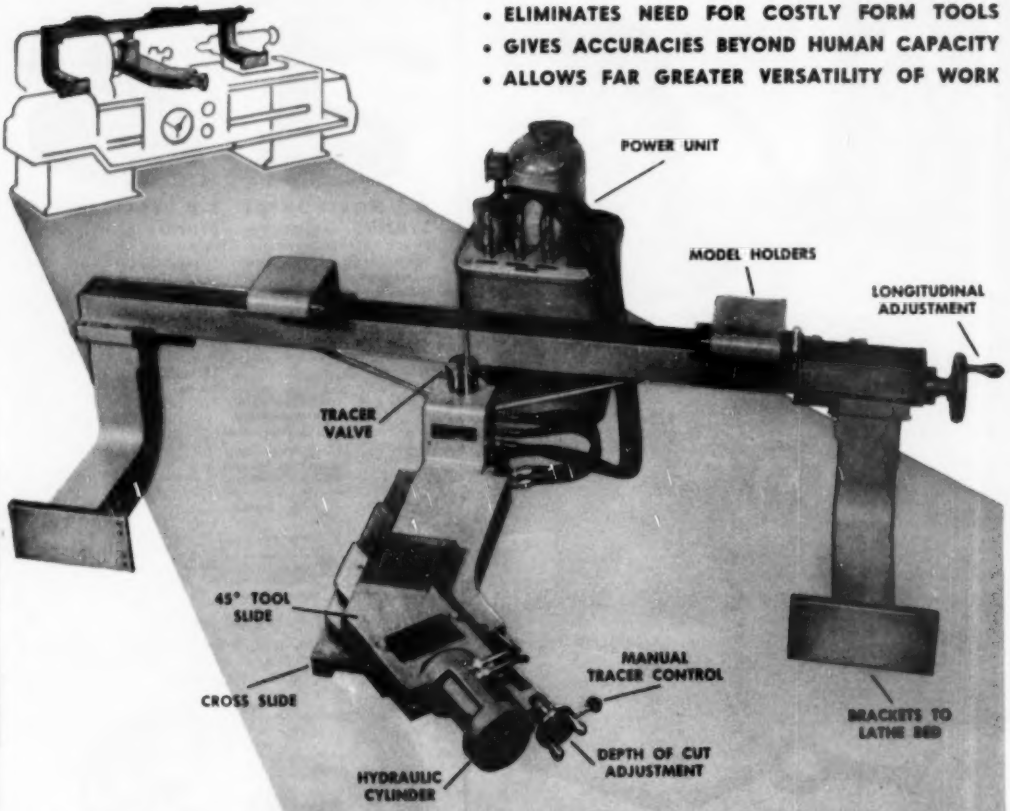
T-P EXTENSION TUBES furnished in 2, 4, 6, and 10 foot lengths for hand or fixture gaging.

T-P means Top Precision

THE TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

Convert your standard lathes to faster, more accurate production with Turchan hydraulic duplicator

- ELIMINATES NEED FOR COSTLY FORM TOOLS
- GIVES ACCURACIES BEYOND HUMAN CAPACITY
- ALLOWS FAR GREATER VERSATILITY OF WORK



This Turchan hydraulic tracer control attachment for standard lathes of any size or make has solved scores of difficult machining problems. The Turchan mechanism replaces the regular cross slide, operating at 45° angle to the work axis. Cutting tool takes uninterrupted cuts over the work, reproducing the model to tolerances of .001". Jobs such as motor shafts, spindles, valve stems, back shafts, piston rods, axles—in fact, any shaft regardless of length, number of steps, tapers and radii is ideally produced on Turchan equipped lathes. There are other Turchan Follower attachments for milling machines, planers, shapers and grinders. "Turn to Turchan to cut costs." Write for new catalog.

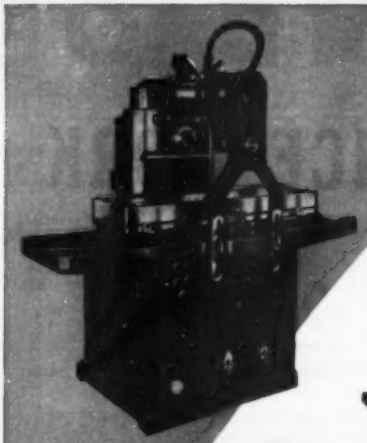
Turning a locomotive axle on a lathe equipped with the above Turchan duplicating attachment, in 2 hours instead of 8 hours.

WRITE US TODAY: Send a sketch and specification of any lathe job. Give make and model number of machine. We'll show you how to produce work better, faster, at lower cost.

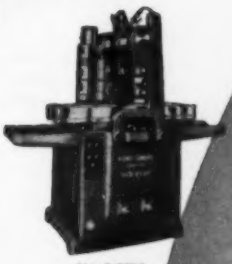
Turchan FOLLOWER MACHINE CO. 6289 LIVERNOIS AVENUE DETROIT 4, MICH.

OLDEST MANUFACTURER OF HYDRAULIC ATTACHMENTS FOR MACHINE TOOLS

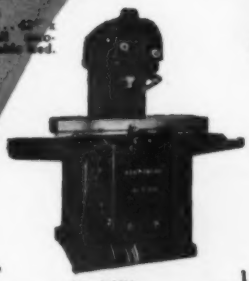
Mill it Faster with
KENT-OWENS



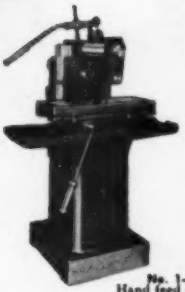
No. 3-3P
30" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.



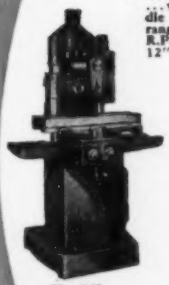
No. 3-30S.
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.



No. 2-20V.
20" table travel . . . vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.



No. 1-M.
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.



No. 1-V.
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.

No. 1-14.
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

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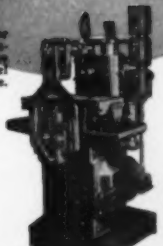

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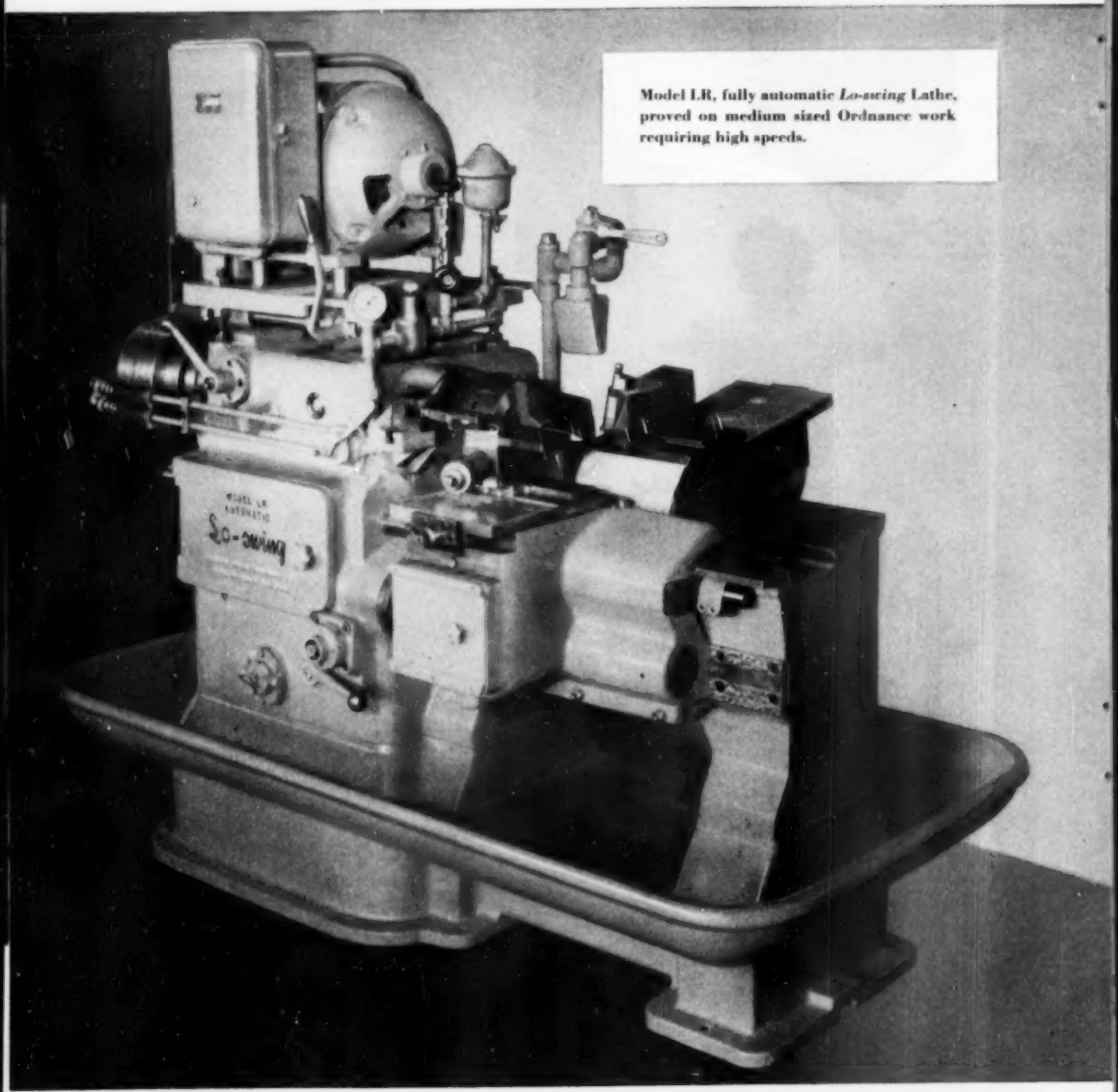

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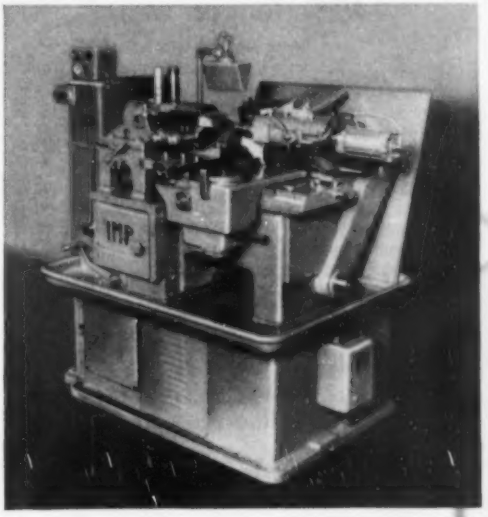
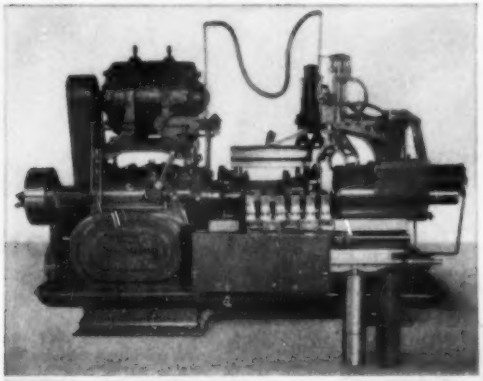
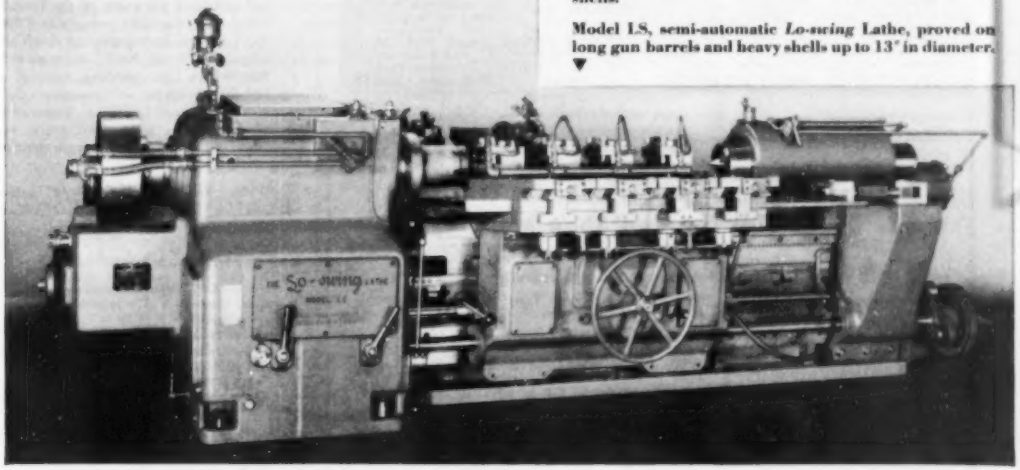


▲ *Lo-swing* IMP, fully automatic Lathe, proved on 40 mm shells and other small diameter work requiring high speeds.



◀ Model R-14, fully automatic *Lo-swing* Lathe, equipped with a double-arm power loader for handling heavy shells.



Model LS, semi-automatic *Lo-swing* Lathe, proved on long gun barrels and heavy shells up to 13" in diameter. ▼

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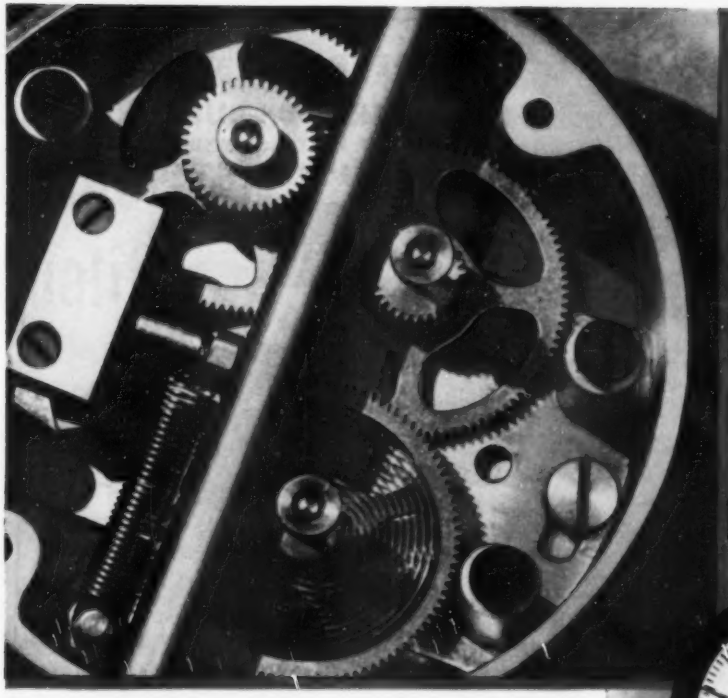

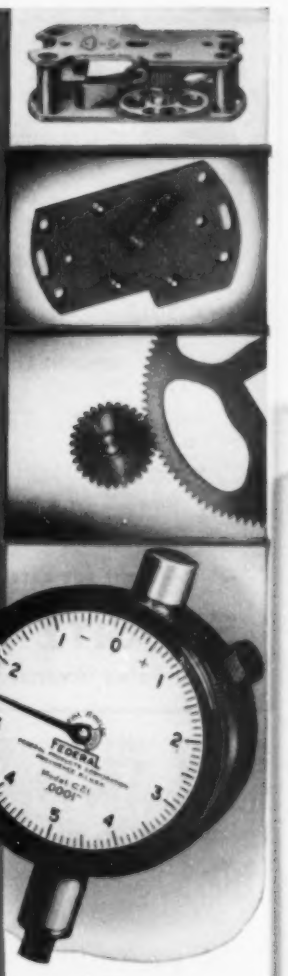

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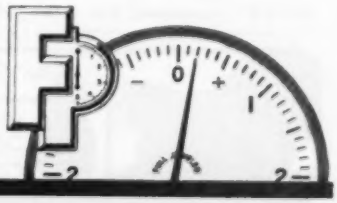

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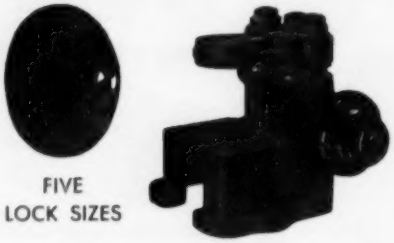

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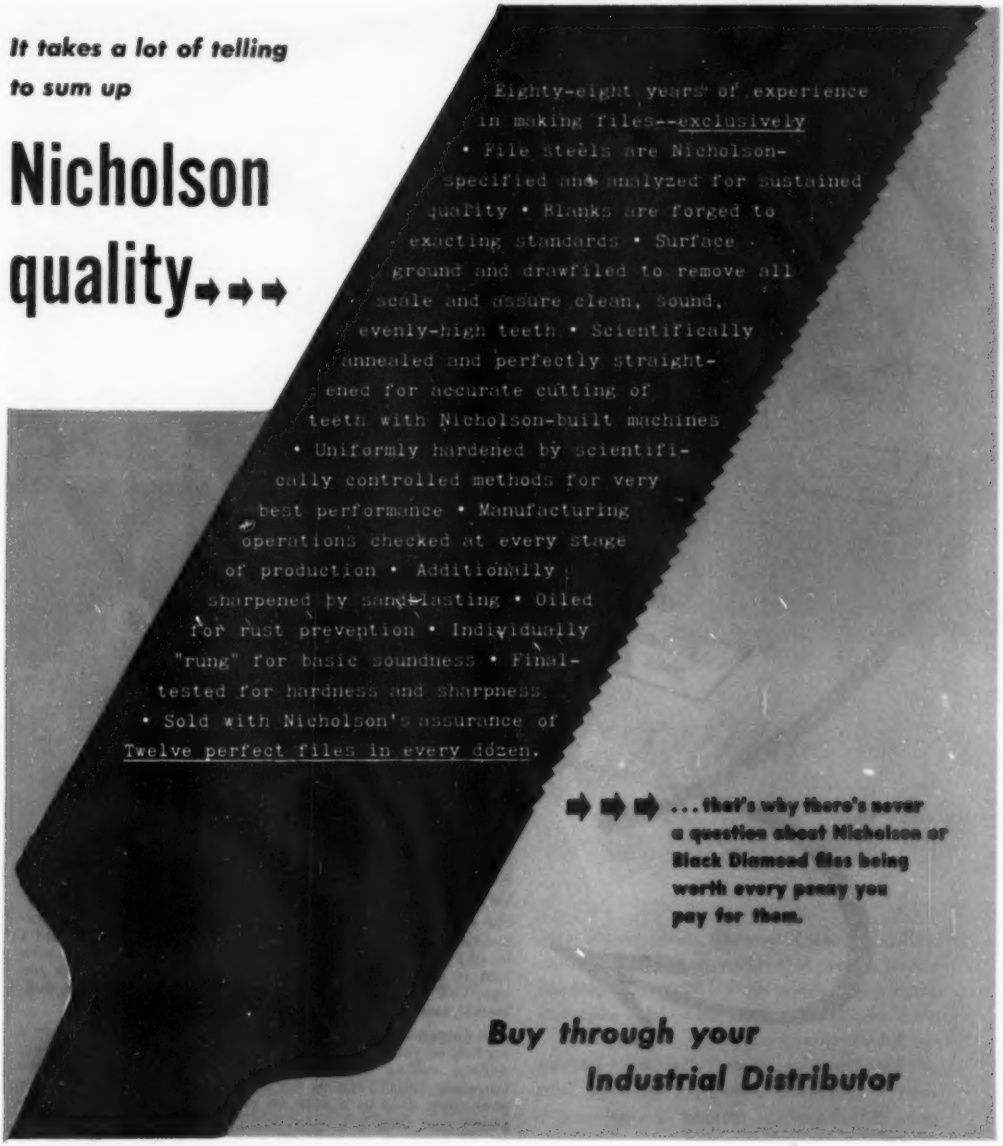
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Photo courtesy of the American Welding and Manufacturing Company and the Titanium Metals Corporation.

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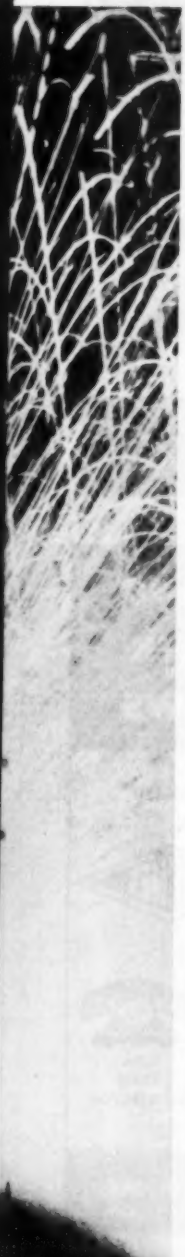

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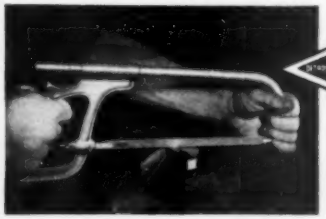

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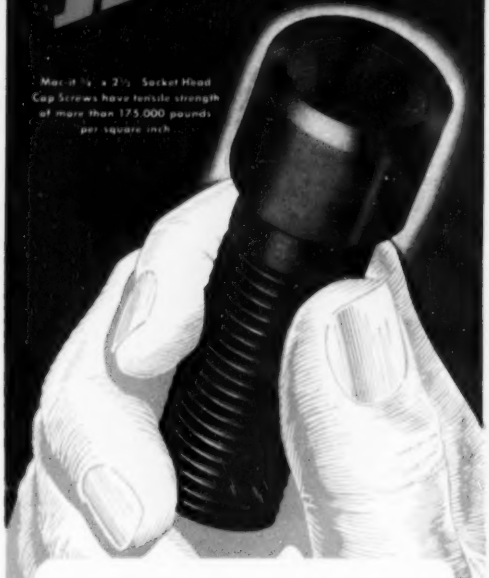

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In addition to Turret Trucks, the Hyster line includes fork-type Lift Trucks, Karry Krane® and Straddle Truck®. Capacity ranges from 1,000 to 30,000 lbs. Sold and serviced by Hyster dealers all over the world. Illustrated above is the Hyster 20 lift truck (2,000 lb. capacity).

FASTER, BETTER WORK FLOW is the result of using a Hyster Turret Truck in metal working plants.

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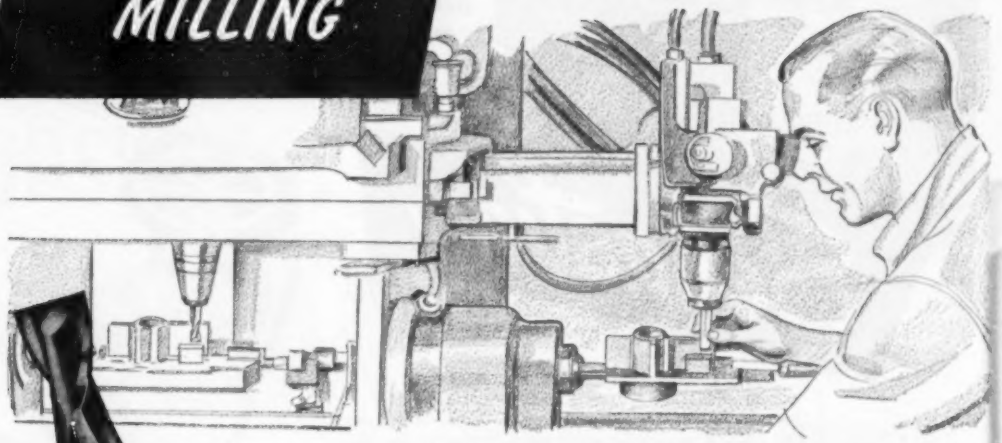

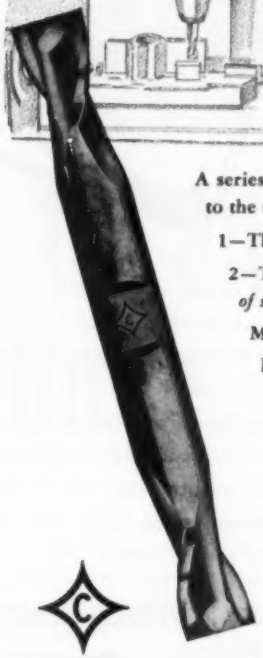

A series of tests on a template follower job, illustrated above, proved conclusively to the user that *Cleveland* End Mills have two outstanding features:

1—They possess *unusual chip clearing ability.*

2—They permit the use of higher speeds and feeds than other mills *without loss of surface finish or tool life.*

More than two years ago the entire line of *Cleveland* End Mills was completely redesigned. Since that time they have been tested repeatedly in customers' plants—and always have been found superior in chip clearing, accuracy, strength, durability, long life and cutting speed. If *you* have not experienced the many advantages of these tools, we urge you to . . .

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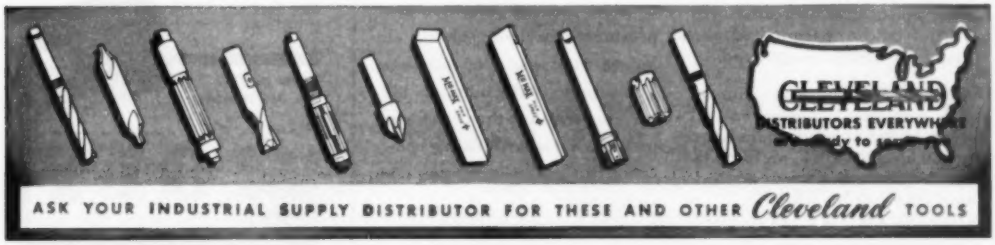
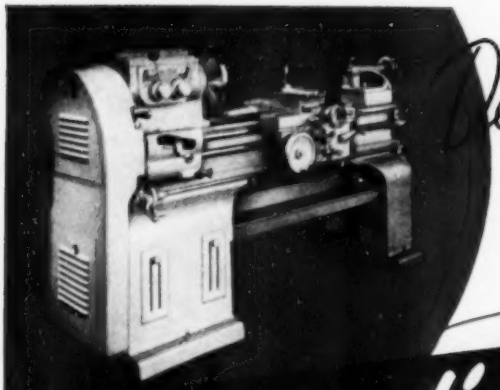


ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS



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Before you buy a general purpose lathe, investigate the medium-priced Sebastian Lathe. It has all the big-lathe features which contribute to consistent accuracy plus time-saving, labor-saving ease of operation.

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MOLY

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REMEMBER that human problems need careful study just as do engineering problems. Man is multi-motivated and one prescription won't cure all his ills.

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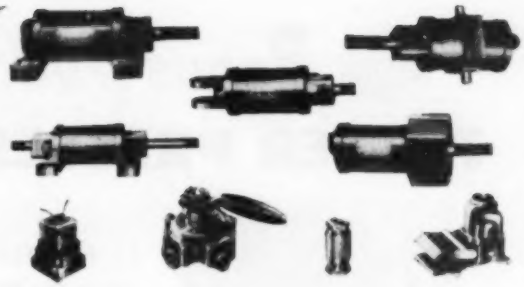

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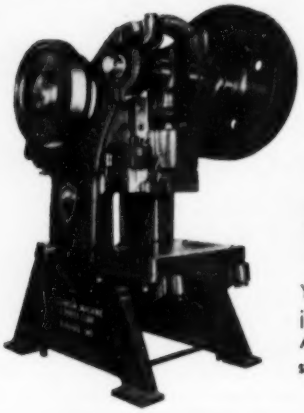

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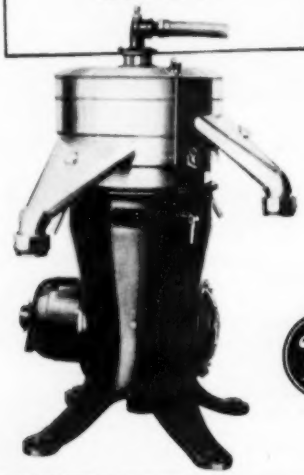

Practically every metal-working plant, large or small, offers many opportunities to use De Laval centrifugal machines. One of the most obvious applications is in the machine tool section. When cutting oil is centrifuged before being returned to the work, it can be reused with perfect safety, for every abrasive particle is removed in the De Laval bowl.

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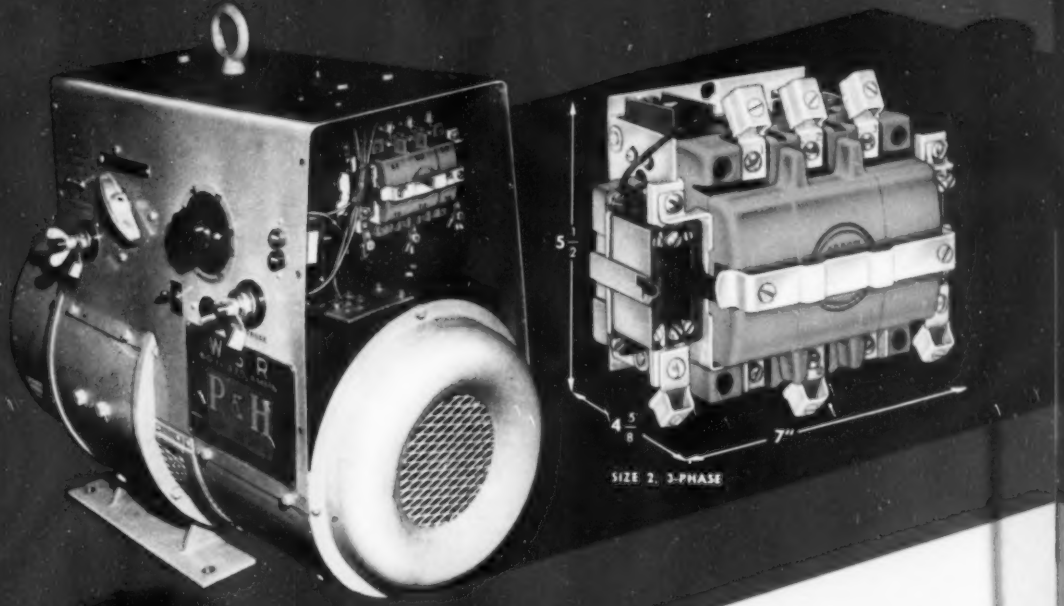

ARROW **AH** HART

TYPE "RA"

ACROSS-THE-LINE MAGNETIC MOTOR STARTERS

JUST 1/2 THE SIZE AND WEIGHT OF ORDINARY STARTERS *PLUS* ADDED PERFORMANCE, GREATER DEPENDABILITY AND STRAIGHT-THRU WIRING

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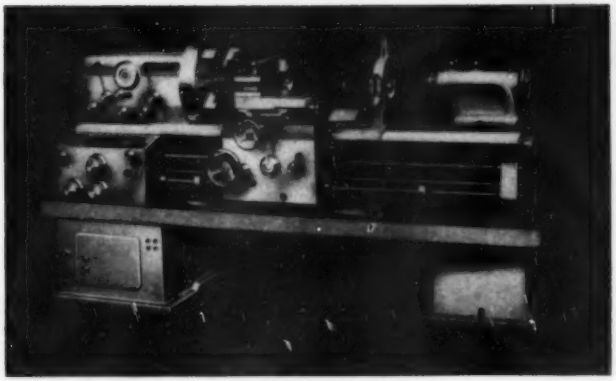
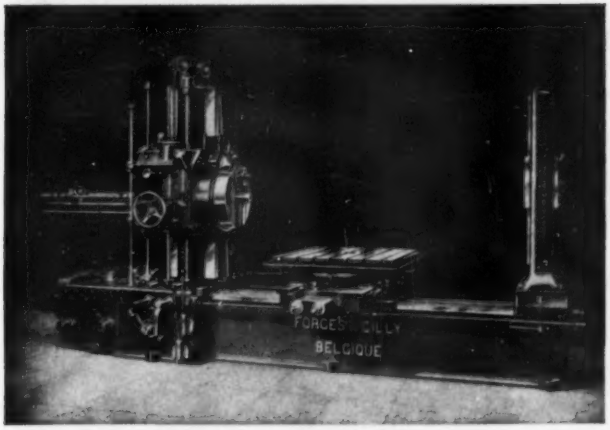


DEMOOR "MAGIC EYE" MODEL 821 (19¼" SWING)

GILLY MODEL AFMF80 (3 3/64" SPINDLE HORIZONTAL BORING MACHINE)



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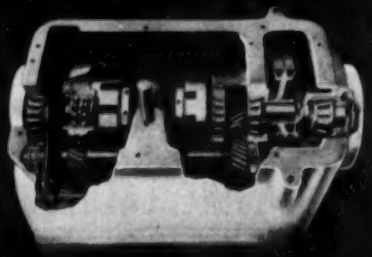

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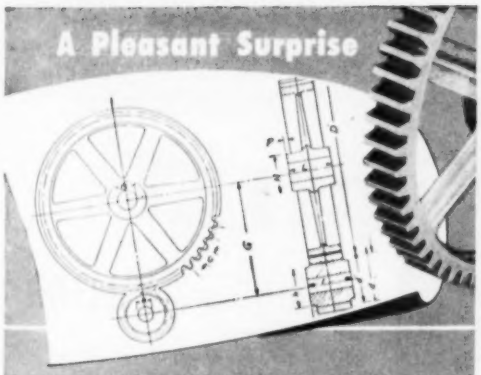

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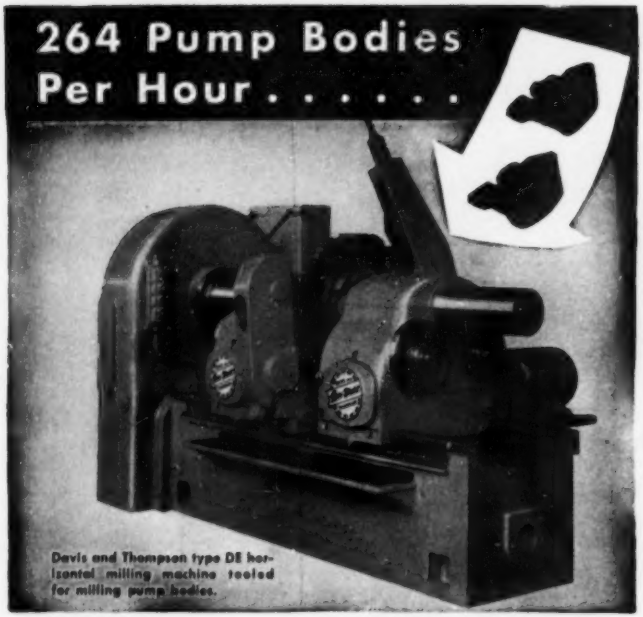

Davis and Thompson type DE horizontal milling machine tooled for milling pump bodies.

1-A Standard Horizontal Milling Machine

Oil pump bodies requiring high degree of finish and high production are rough and finish milled on both sides simultaneously with this Davis and Thompson type DE milling machine. Production is 264 pieces per hour.

Patented Angular Spindle Adjustment Allows "Toe Cutting"—Maintains Fine Finish at High Production

The finishing spindle is provided with an exclusive D&T design which allows angular adjustment. This in turn results in "toe-cutting" and eliminates "drag" of the cutter over the finished surface. Both roughing and finishing spindles have micrometer endwise adjustment.

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Like all D&T machines this model DE is designed for long life and trouble-free operation. Each head has independent drive. There is backlash take up to mandrel. Anti-friction bearings throughout. Rapid traverse between cuts can be incorporated.

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BY EUGENE L. GRANT

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- simple language is used
- explicit directions are given for the use of the various techniques
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- many charts, diagrams, graphs, and sample reports illustrate details of control chart use
- tables in the back supply important working data

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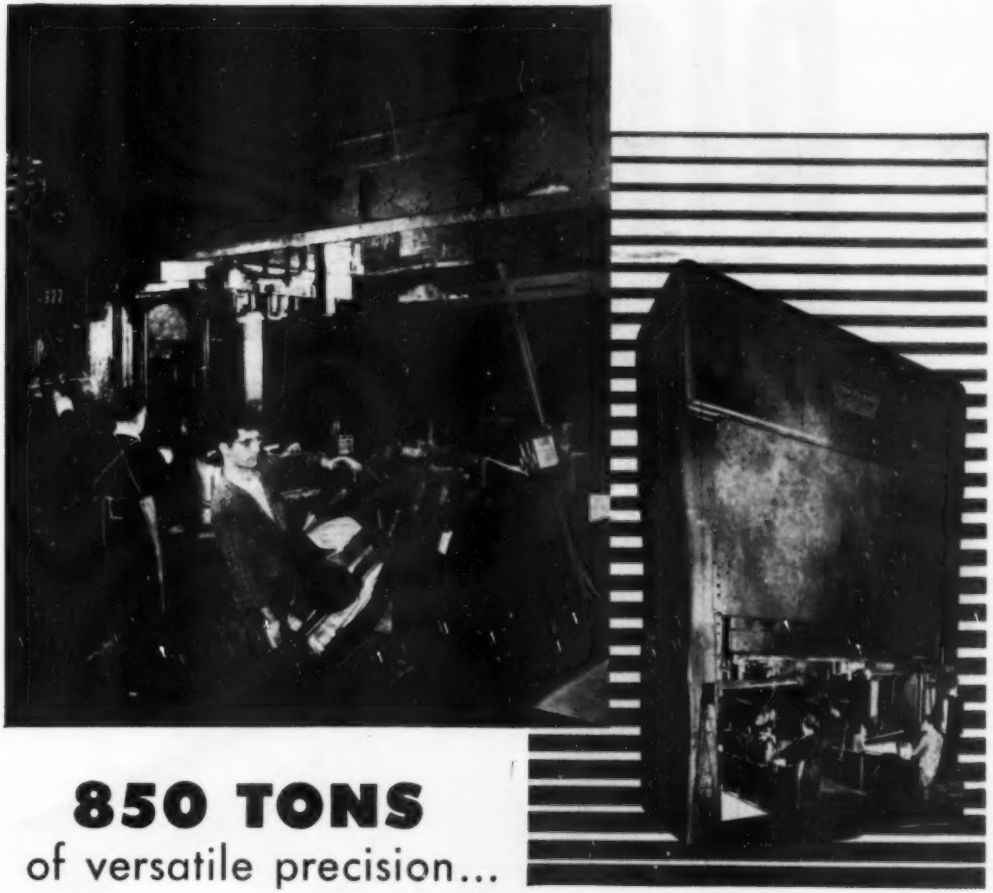

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In the automotive industry where competitive position is measured in parts per hour, this Cleveland Four-Point Press has proven to be a valuable workhorse for a well known automotive manufacturer. Its efficient operation and versatility have resulted in a sizeable upswing of production figures.

The wide 160 inch bed area readily accommodates tandem or progressive dies as well as large single units. Slide control of this press equipped with a Cleveland Drum Type Friction Clutch is so sensitive and accurate that it is used for delicate precision work or it easily forms large rugged units. Sturdy, cast construction and extra long gibbing assure continuous accuracy.

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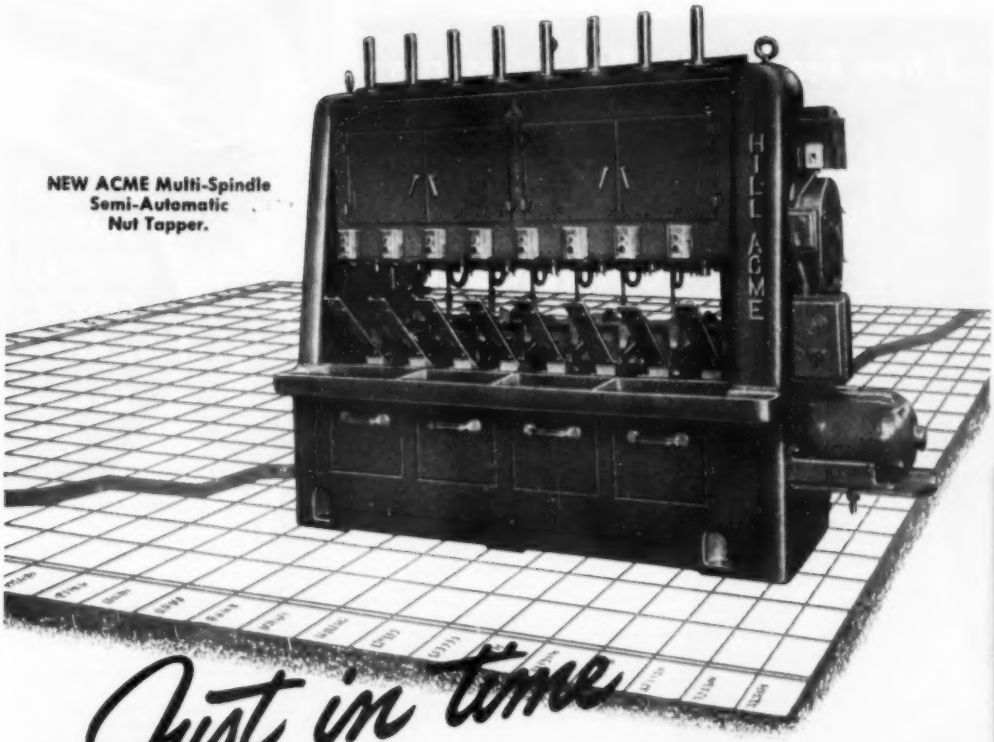

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Just in time

TO HELP YOU INCREASE PRODUCTION

Redesigned just in time to meet the needs of increased production in your plant, this ACME Model XWT eight spindle nut tapper will not only step up production but because of semi-automatic operation, will greatly reduce operator fatigue. Built in 6 and 8 spindle models in 1″ and 2″ capacities. The same machine can also be adapted for tapping couplings. Delivery schedules are reasonable.

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1. Conveniently located push buttons operate the spindles.
2. Hydraulically controlled spindle cycle.
3. Repeat cycle is automatic.
4. Adjustments for change of cycle are quick and easy.
5. Change gears running in oil bath easily replaced for different spindle speeds.
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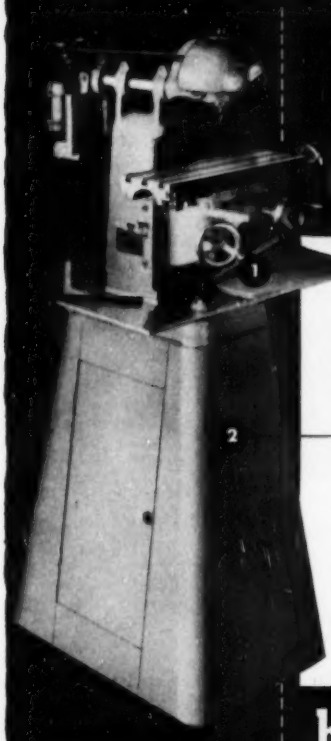

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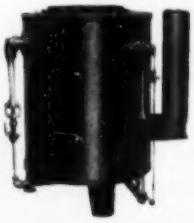
NO BLOWER or POWER NECESSARY



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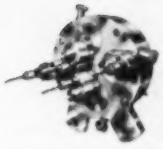
FULLY ADJUSTABLE DRILLING HEAD



Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns.

ADJUSTABLE TAPPING HEAD

Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case.

ADJUSTABLE DRILLING HEAD

This versatile tool permits you to take advantage of a wide range of adjustment without overhang

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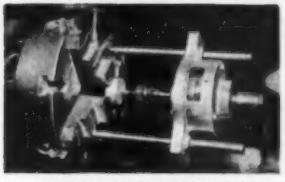
Cut small hole tapping cost with Errington Cone Drive 2 to 1 Auto-Reverse. Ball and bronze bearings throughout. Taps to 3/16" in steel and 1/4" in cast iron. Also with Jacobs Rubber Flex Chucks.



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A new tool, practical, time-saving, money-saving. In a turret lathe setup it allows you to tap the hole and back out the tap without stopping the work or reversing the machine

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Send us your blueprint, sketch or sample for a quotation.

Shown is a 10 Spindle Multiple Drilling Head, drilling ten varied size holes on different elevations. The head has grooved thrust ball bearings at all thrust points and hardened bronze radial bearings. Heat treated spindles and gears of one piece turned from solid bar stock. It is geared approximately 2:1. All enclosed in a sand-cast aluminum case and cover, with alemite pressure lubrication.

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Saddle traverse along arm	3'2"
Baseplate:	
Length of working surface	4'9"
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Height of working surface	9"
#4 Morse taper	
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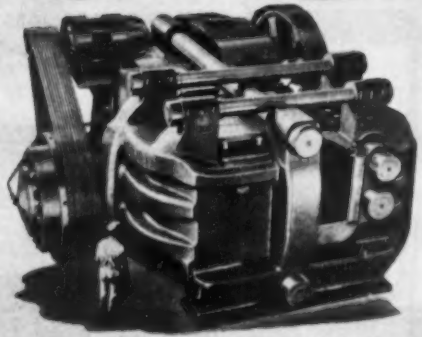

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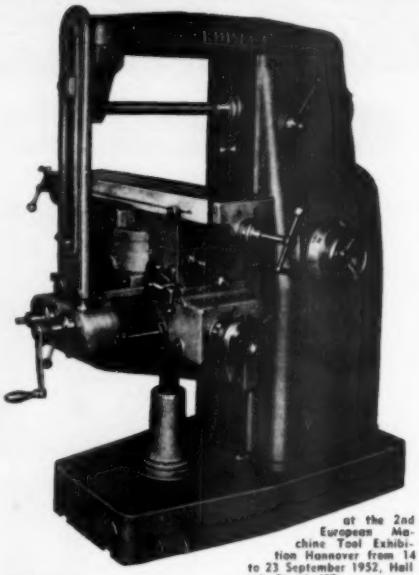
RUMAG Milling Machines



at the 2nd European Machine Tool Exhibition Hannover from 14 to 23 September 1952, Hall 4, Stand 407.

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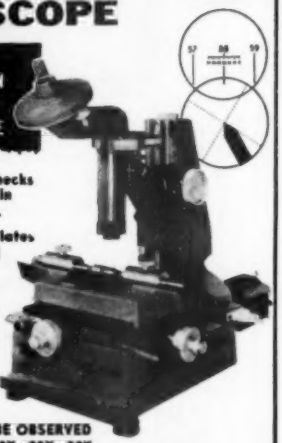

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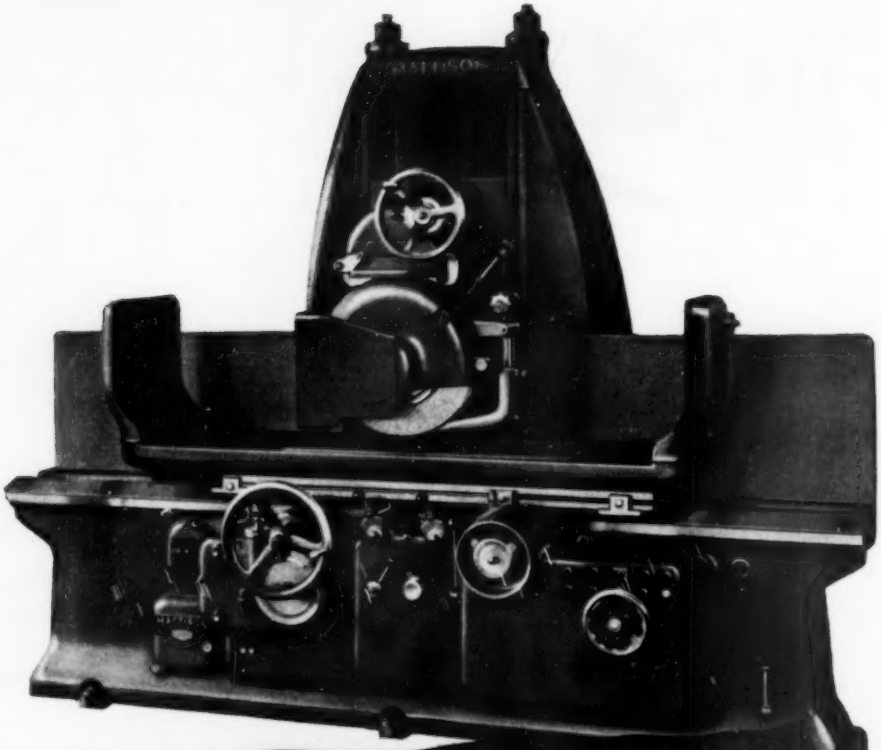
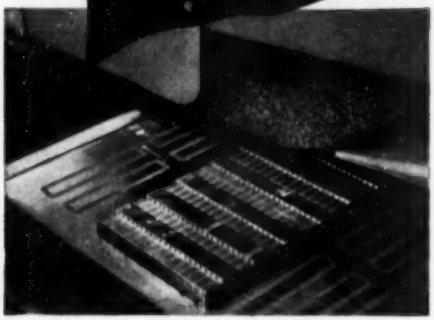


HERE'S A CHANGE THAT INCREASED PRODUCTION FROM 30 PER HOUR TO 200 PER HOUR



Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production — 30 per hour.

● Because of the greater load and grinding area of their Mattison High Powered Precision Surface Grinder, Geo. T. Schmidt, Inc., Chicago, Illinois have been able to effect considerable savings in grinding time over their previous method. As an example — the type stamps shown in the picture above were formerly ground a few pieces at a time on a small grinder — 30 per hour. The Mattison Grinder they are now using provides larger table space and a larger grinding wheel together with the necessary power and stability to permit the grinding of more pieces per load at a production rate of 200 per hour. Similar results are obtained on other parts.

Mattison High Powered Precision Surface Grinders have the high power and rugged double-column construction for rapid stock removal and the precision necessary for high quality finish and accuracy to close limits.

This combination not only will enable you to step up production on small parts, but permits grinding large work which previously could not be handled. For further information send for free circular.

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MANUFACTURING MILLERS:
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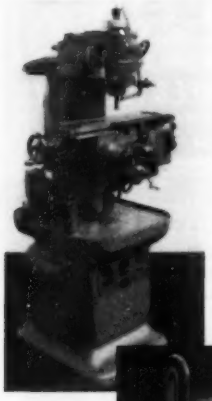
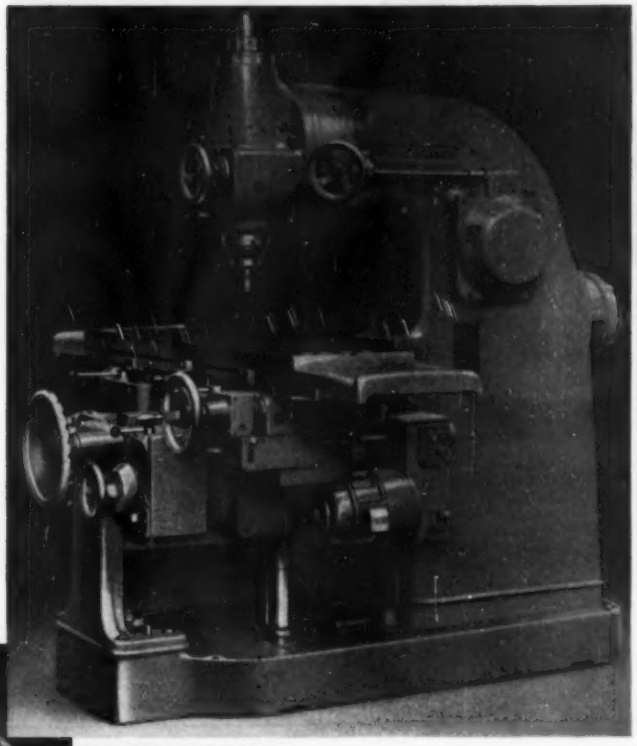


No. 0 Vertical



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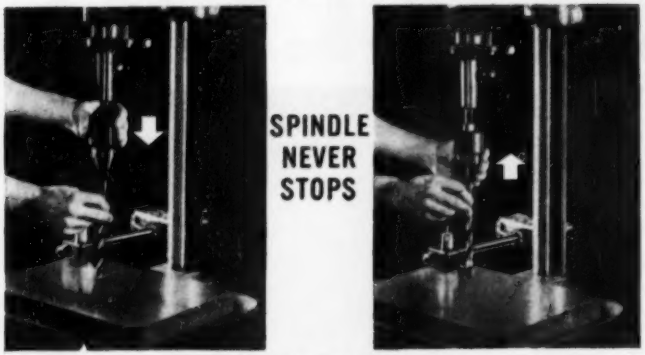
no keys . . . collets . . . or wrenches



HERE'S ALL THERE IS TO CHANGING TOOLS

TO OPEN – Grip Sleeve – pull down – jaws open automatically – tool is released.

TO CLOSE – Insert new tool – push up tapered part – tool is locked in place.

SAVE TIME—Change tools with spindle running . . . no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

SAVE MONEY—One spindle does the work of several. Smooth, hardened and ground jaws grip tight without chewing tools.

IDEAL FOR—Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

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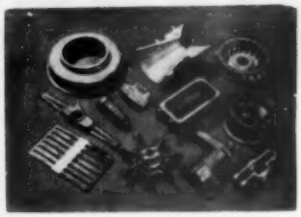

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How to estimate the time element in any machining job

Use this manual to make the winning but safe bids that mean more jobs and better profits for your shop.

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BY W. A. NORDHOFF
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456 pages, 480 illus., $6.50

Here's the kind of on-the-job help you need to make quick, reliable estimates of the time it takes to do the different machining operations in any machine-shop, large or small. Whether a job involves drilling, boring, tapping, threading, grinding—or any of the scores of other operations—this handy manual tells you exactly what to consider in estimating job-time.

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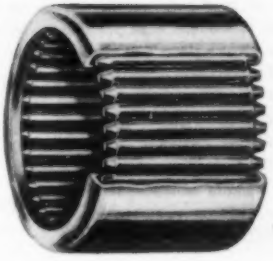

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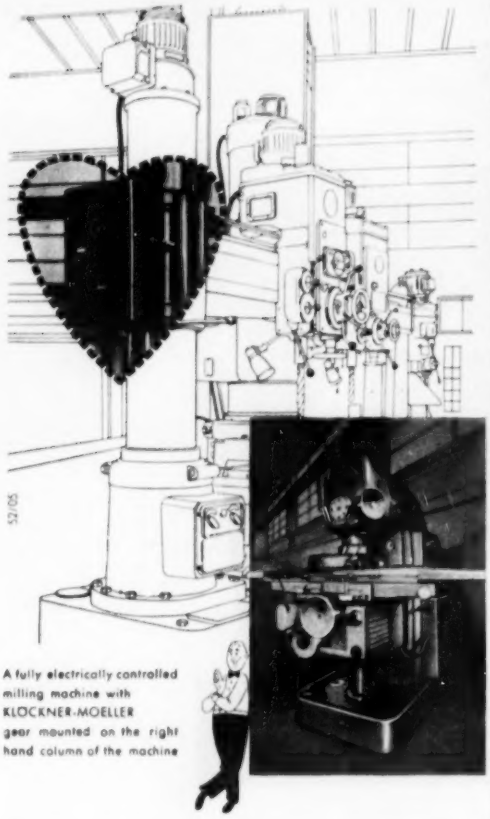

A fully electrically controlled milling machine with KLÖCKNER-MOELLER gear mounted on the right hand column of the machine

Machine-tools with their complicated mechanisms are almost comparable with human beings. As in their case, the performance depends on the cooperation of all parts. The switchgear installed in modern high precision machine-tools is the controlling unit which starts and checks the various operations. The value of machine-tools depends largely on the efficiency, reliability of operation, and the life of the switchgear. Klöckner-Moeller switchgear is known to meet efficiently these requirements. It is available in attractive, hermetically closed steel cabinets, ready for immediate connection. The life of this equipment will be equal to that of the machine, without requiring any service.

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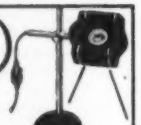

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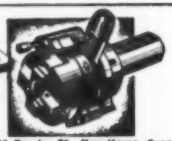

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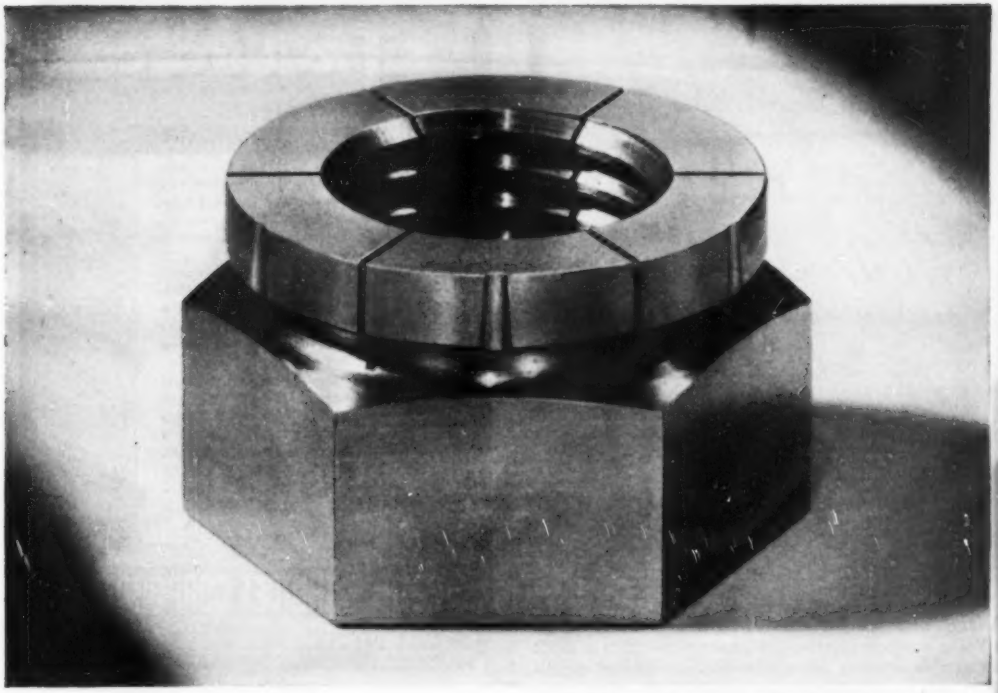

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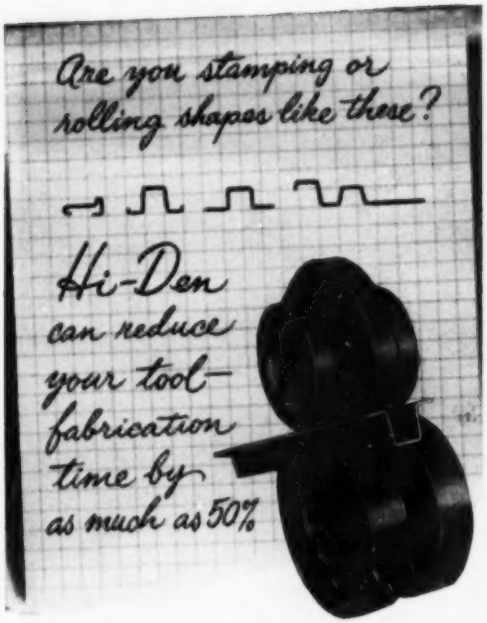

A large aircraft manufacturer* reports HI-DEN rolls in a Yoder machine produced these short-run parts in stock sheared from sheet aluminum (in as-quenched condition) more satisfactorily and economically than other methods tested. And *tool fabrication time was reduced* 50%.

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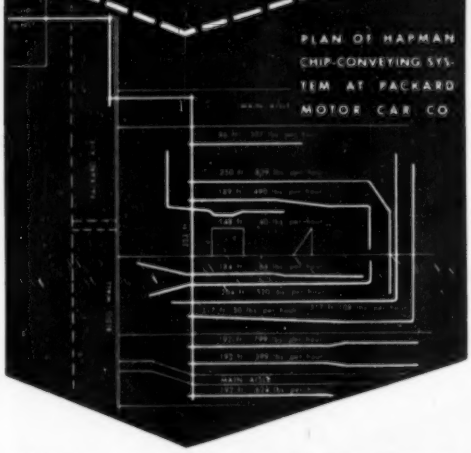

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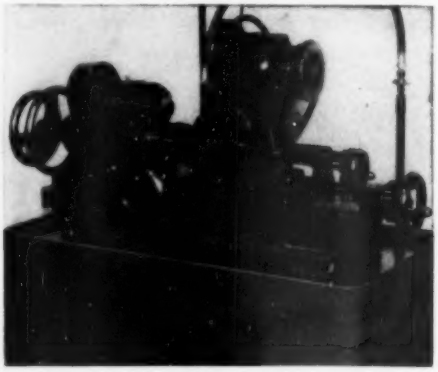

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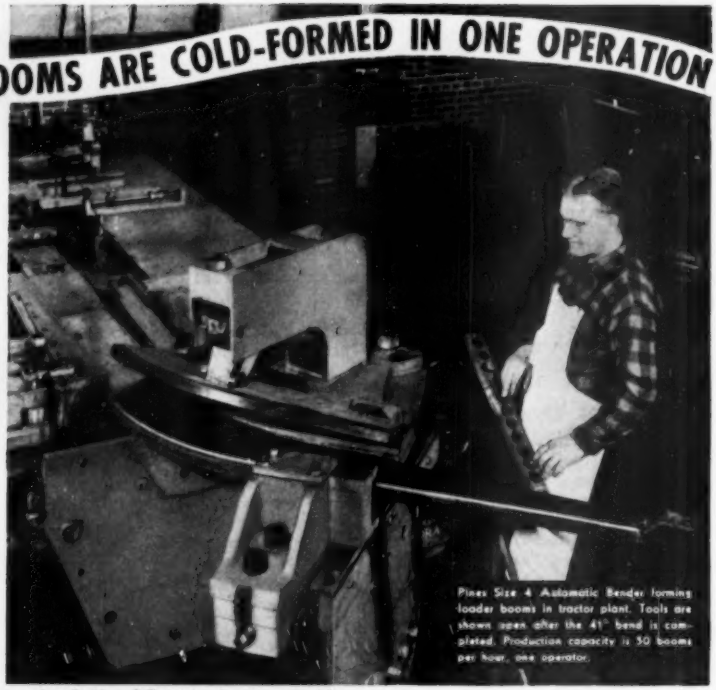
HOW HOLLOW BOOMS ARE COLD-FORMED IN ONE OPERATION

on a

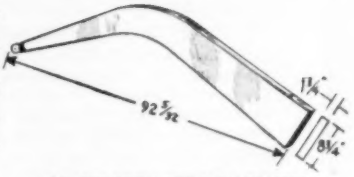
PINES *Automatic* BENDER



Pines Size 4 Automatic Bender forming loader booms in tractor plant. Tools are shown open, after the 41° bend is completed. Production capacity is 50 booms per hour, one operator.

41° Edge Bend in Heavy 12-Gauge Stock Simplifies Production Problem

Here's another example of how cold-forming the "Pines-Way" speeds production and lowers costs. The setup illustrated shows tooling on a Size 4 Bender used for edge bending a heavy 12-gauge (.112″) hollow tractor loader boom. The pieces are fabricated with a gradual taper, and two straight U-shaped strips are arc-welded together. By adopting the Pines bending method, instead of making curved pieces on a press, a substantial reduction in die cost and scrap losses are affected.



LOADER BOOM FOR FARM TRACTOR
Workpiece is fabricated from two tapered U-shaped pieces, arc-welded together. Both right-hand and left-hand booms are formed on same machine.

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The Bender and special tooling, engineered by Pines, produces a smooth 41° edge bend to a 34″ radius. The draw bending principle employed permits holding close tolerances for easy assembly. By using a flexible floating-type mandrel, tapered to fit the inside of the workpiece, and a separate hydraulically-operated hold-down shoe that works in sequence with the clamping die, wrinkles and buckles are eliminated. One man handles the entire bending operation. The hydraulic bending and return cycle is automatic, push-button controlled.

View of floating-type flexible mandrel and tapered sliding pressure die. Automatic air-operated support holds mandrel in proper alignment on forward stroke, retracts for clamping. Same machine with different tooling also cold bends 3″ heavy wall pipe for undercarriage loader supports.

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American Machinist's *75th Anniversary Issue* 1877 · 1952

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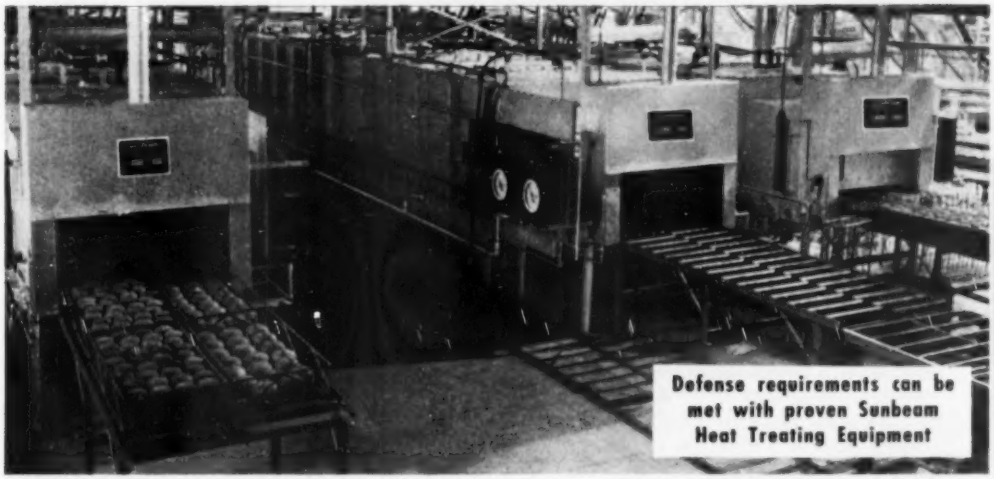
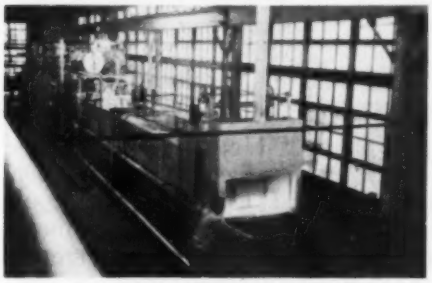
at EKCO PRODUCTS, Massillon, Ohio



In the manufacture of 105 mm steel cartridge cases for Army Ordnance by Ekco Products, three Sunbeam electrically heated, roller hearth, atmosphere-controlled annealing furnaces are used for annealing the cases between the various draw press passes. As the height of work varies after each press draw operation, one unit is designated to handle a pre-determined number of sizes.



Discharge view of one of the three Sunbeam units in use at Ekco. As work becomes bulkier, during the last draw press passes, a greater furnace volume for annealing is required during the 3rd and 4th anneal as compared to the 1st and 2nd. This makes it possible to divide the work among furnaces in a volume rather than weight basis.

To fabricate large caliber steel cartridge cases for Army Ordnance by the cold drawing process at Ekco, it is essential to provide an accurate anneal between the various passes through the dies. The anneal must provide a controlled, even hardness throughout the entire cross-section of the case, starting from the cupping operation through the last drawing pass. This accurate control of hardnesses makes it possible to hold to closer size tolerances, improves surface qualities of the case, lessens the possibility of cracking during its fabrication and increases die life. Accordingly, the quality of the annealing has a direct effect on the number of acceptable cases produced.

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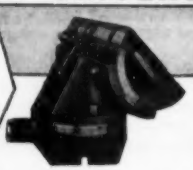

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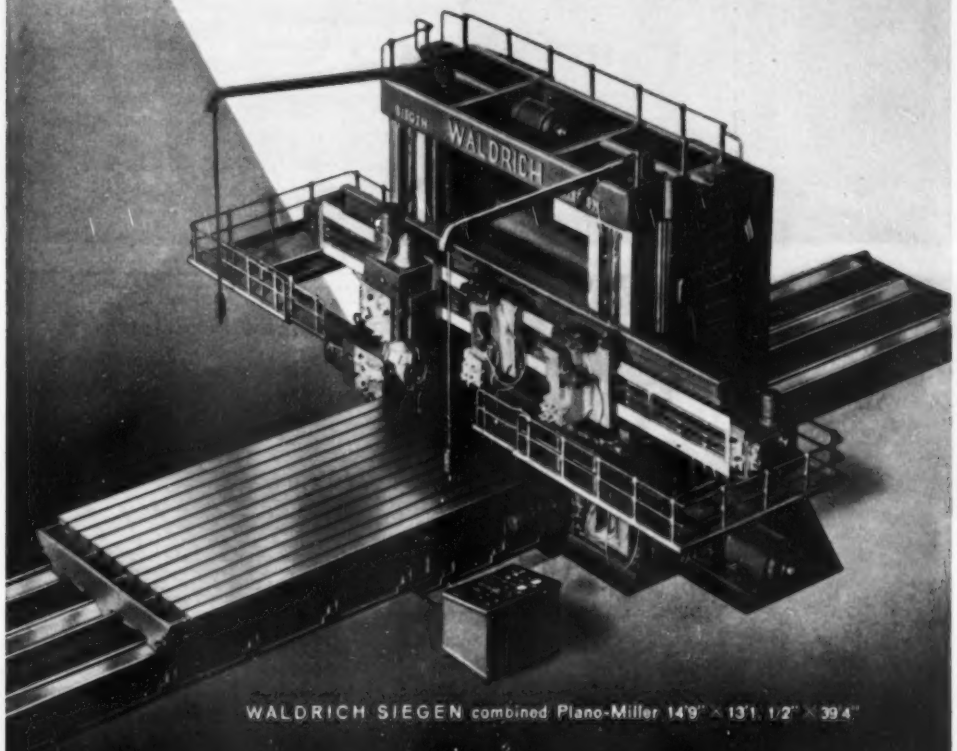

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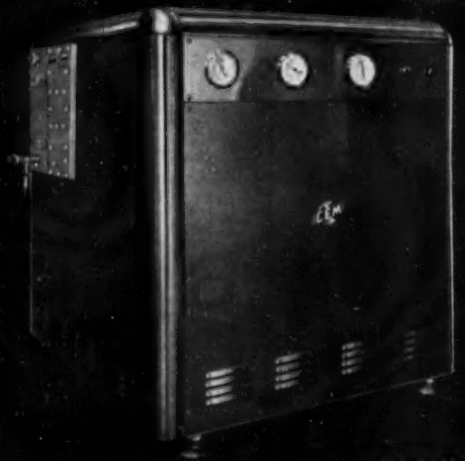

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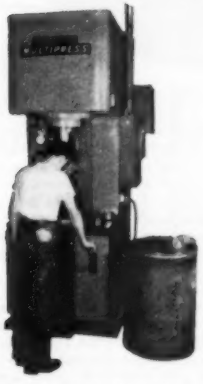

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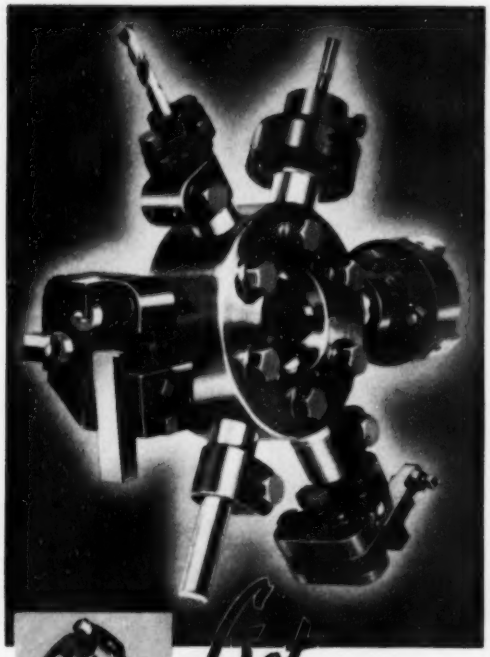

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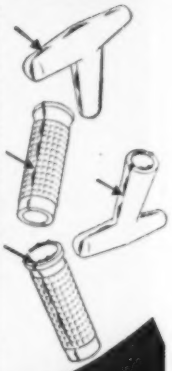

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Sis is boning up to write her entry in the Citizenship Essay Contest the businessmen's association is sponsoring at school.
Dad's easy chair is empty —he's at the meeting of the citizens' get-out-the-vote committee.
Mother's helping her club make a telephone campaign telling everyone when and where to register.
Grandma's sending registration reminders to all the church members. Even little Sis is helping—rubber-stamping messages on the cards.

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NOT THE FARM VOTE...
THE BIG-CITY VOTE...
THE LABOR VOTE...
OR ANY PARTY VOTE...

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Here are economical, sales-building methods that produce more attractive products

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—the design of parts which require finishing
—new finishing equipment and processes
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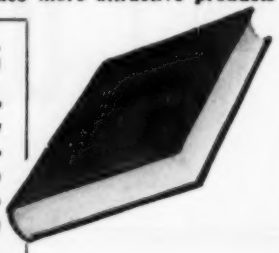

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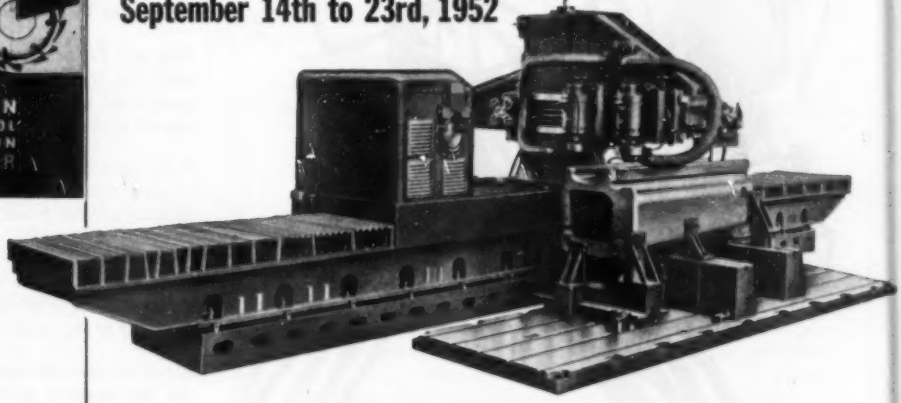

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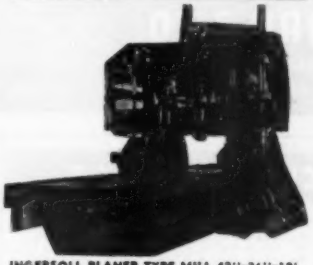
CRANE, OET Ricker 2 tons 11'9" span.
CRANE, OET Shaw, 10 tons, 58'8" span.
CRANE, Cactus #8 Portable Gooseneck 3 ton cap.
CHIP WRINGER, Barrett #25H, M.D., 18" dia.
CHIP WRINGER, 20" Tolhurst M.D., Late.
RADIAL DRILL, 3'x9" Cincinnati-Bickford, M.D.
RADIAL DRILL, 4'x11" Americas, M.D.
RADIAL DRILL, 5'13" Cincinnati-Bickford, M.D.
RADIAL DRILL, 6'x19" Cincinnati-Bickford, M.D.
RADIAL DRILL, 10" Walker Turner M.D., Late.
DRILL, Foodick 10", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D. #4 M.T., M.D.
DRILL, #121 Baker Auto., S.S. Cam Operated.
DRILL, Deep Hole, Avey-Draulic #2, M.D.
DRILL, Deep Hole, Pratt Whitney #2 Gun Barrel.
DRILL, Edlund #2B, 3 spdle. #2 M.T., 16".
DRILL, 4 & 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, 4 Sp. Barnes H.D., M.D. #4 M.T., P.F.
DRILL, Cincinnati 21" with Tapping Attach. M.D.
DRILL, Natco Multiple Spdle #12, #1 M.T., M.D.
DRILL PRESSES, Leland Gifford #1MS, 1, 2, 3, 4.
DRILL PRESS, #2MS Buffalo Forge single spindle.
DRILL, Barnes, 24" S.S., #4 M.T., 1½" cap.
DRILL PRESS, #25 Foote-Burt S.S. 24", #5 M T
DRILLS, #14, #15, #16, #18 Buffalo Forge, M.D.
DEEPFREEZE Motor Products 40° below zero.
DEMAGNETIZER, SB-811 Magnaflux, late type.
FACING HEADS, 20" & 24" Hummert-Dixon.
FILER, #11-S Cochrane Bly Auto Saw Filer.
FILER, #11-S Type P4, Floor Type, M.D. Thiel
FURNACE, Westinghouse Elec. 10 KW, 2100° F. cap.
FURNACE, Mackler Steam Oven, Serial #3543.
GRINDER, #2 Cinc. Centerless, M.D. Thru Feed.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Disc, Beely #20S, 18" Dble. End.
GRINDER, Heald Rotary #25, M.D., 18" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, Cylindrical, Cinci, 6x18 Filmatic, Late.
GRINDER, Thread, Jones & Lamson #TG-615, Late.
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface.
GRINDER, 6"x18" Norton "C" Hyd. Plain Cyl. Late.
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, #16 Blanchard Vert. Rotary Surface M.D.
GRINDER, Oliver Auto. M.D. Drillpointer.
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.

LANDIS 6 x 18 Hyd. Cyl. Grinder, Type C. Serial #29196.

GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Diamond Snagging 10 HP, 24"x6¼".
GRINDER, Norton Gsll Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, Landis 6"x18" Hyd. Cyl. late type, M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterholm Disc, 24" cap.
PROFILE GRINDER, Studer Type PSM, M.D., late.
GEAR HOBBER, #3 Barber Colman, M.D.
GEAR HOBBER, B & S #34 Spur, 10" dia. M.D.
GEAR SHAPER, Fellows #6 High Speed, M.D.
GEAR SHAPER, Fellows #7 High Speed, M.D.
HAMMER, Rochester Hispeed, all sizes M.D.
HAMMER, Bradley 2000# Rubber Cushioned Helve.
HEADER, Manville #1 S.S.S.D. Cold, 3/16".
INDUCTION HEATER, 15 KVA, Ecco Hi Frequency.
INDUCTION HEATER, 30 KW Lepel, Late Type.
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HOIST, 5 ton capacity Shepard Electric.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.
KEYSEATER, #5 Witts & Merritt, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

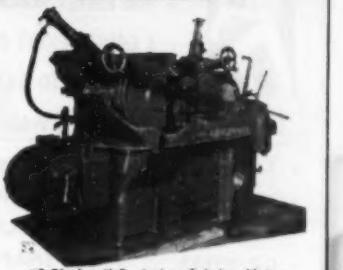
DISC GRINDER

Osterholm 37" Wheel Diameter Disc Grinder. 40 HP. TEFC 3/60/440 spindle motor drive. 24" capacity.



INGERSOLL PLANER TYPE MILL 43"x36"x12', 4 Heads.

LATHE, Lo-Swing 8"x100", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9"x15" Geared Head Prod.
LATHE, 12"x16" Lips Cerbo, Late Type, M.D.
LATHE, Hendey 12"x25' Q.C.G. Taper Attach. M.D.
LATHE, LeBlond 14"x6', Q.C.G. M.D.
LATHE, Hendey 14"x3' Q.C.G. Taper Attach. M.D.
LATHE, Lodge & Shipley 16"x8', Q.C.G., Grd. Hd.
LATHE, American 18"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 18"x7' Q.C.G., M.D.
LATHE, American 18"x19' Q.C.G., Grd. Hd.
LATHE, South Bend 19 26"x8' Gap Bed, Q.C.G. M.D.
LATHE, Hendey 20"x10' Q.C.G., Tapper Att. M.D.
LATHE, Reed-Prentice 20"x10' Grd. Hd. M.D.
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, Putnam 24/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Lodge & Shipley 26"x14', Q.C.G., M.D.
LATHE, McCabe 28/48"x18' Double Spindle Lathe.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, Bullard Dble. End #VMT5, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret #2 Bardons & Oliver Late Type, M.D.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret, #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #2 Cinci. Acme Univ. Geared Head.
LATHE, Turret, #3A Warner & Swasey Univ. M.D.
LIFT TRUCKS, Baker 1 & 2 ton, Platform & Fork
MILL, #4 Burke Motor Drives, Late. M.D.
MILL, 36 N. Sundstrand Horiz. Hyd. 2 Sp. M.D.
MILL, #2 Pratt & Whitney Prod. Duplex, M.D.
MILL, #48 Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #0Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinc. Horiz. #5, #4, #3 High Power, M.D.
MILL, #3C Becker Vert. Die Sinker, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cinc. Vert. Prod. Late, M.D.



#2 Cincinnati Centerless Grinder, Motor Driven, Thru Feed.

MULT-MILLER, U.S. Tool #MM-1-0, Auto. Prod.
MILL, #0 Vernon Hand Mill, M.D. Late.
MILL, PLANER, Ingersoll 42x36x12, 4 heads.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILL, #5 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #4 Cinci. Vertical Hi Power, M.D.
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 100 KW.
NIBBLER, Grey Turret Type ½"x24" cap. M.D.
OZALID Model "F" Whiteprint Machine, Late.
THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL 6x14 Pratt & Whitney No. 1100.
THREAD MILLER, Loco-Bradnor #46A Automatic.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.
PAPER SHREDDER, No. 10 Witts & Merrill, M.D.
PLANER, Cincinnati 36"x36"x12' A.C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x36" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #183-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, 125 ton Clearing Single Crank 8" Str., Late.
PRESS, 70H Drake Hydraulic Arbor, New.
PRESS, #75½ Bliss S.S. 9½ Str. M.D.
PRESS, Robinson #5 O.B.I. 83 tons, M.D.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Bliss #15, #19, #20, #21, OBI, A.C., M.D.
PRESS, Toledo 99½, S.S. 440 ton cap. 9" str.
PRESS, Waterbury-Farrell High Speed 60 tons #3W.
PRESS, GAC Bliss Double Action, 3 crank.
WHEEL PRESS, Chambersburg 400 tons cap. Hyd.
PRESS, Lucas 15 tons Power Arbor M.D.
PRESS, #60 Whitney Deep Thr. 24", foot.
PRESS, P2, 75 Ferracute M. D. Ball foot.
PANTOGRAPH, #1A Garton M.D. Engraving.
PUNCH, R-41-P Wiedemann Turret, 14 stat. 24" thr.
PUNCH, Hasker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End. 24" Thr. 1" thru 1".
PUNCH, H & J #5 Sgle end. 48" Thr. 2" thru 1½".
RIVET SETTER, ⅜" cap. Penn. Tubular Rivet.
ROLLS, Bertsch Pyramid 18"x1¼" cap., M.D., Late.
ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROUTER, #W240D, Geared, Electric H.D.
COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #60 Marvel Hack Saw 6"x6" Cap., M.D.
SAW, #8 Marvel Band 18"x18" cap., M.D.
SAW, #302 Campbell Abrasive Cut-off, M.D.
SAW, #2B-C Racine Shear Cut 6"x6" cap. M.D.
SAW, Band, Tannewitz & GH-36" High Speed, M.D.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, G & E 24", high duty, back geared, M.D.
SHAPER, 32" Cinci. M.D., Motor driven, H.D.
SHAPER, Morton 36" Draw-Cut, 4-Speed, M.D.
SHEAR, Quickwork #-1 Rotary 60" Throat, 10 ga.
SHEAR, #9E Niagara M.D. 6'x3/16" cap. M.D.
SLOTTER, 12" New Haven Vertical, M.D.
SPRU CUTTER, Milwaukee 56 tons, 2½ cap. M.D.
SURFACE PLATES & TABLES, all sizes.
TAPPER, #1 CAM Haskins, Motor Driven, Late.
TAPPER, #1 Bokowski (Warner & Swasey) Late.
WELDER, 200 & 400 amps. Gen. Elec. Portable, Arc.
WELDER, 200 KVA Federal, Projection.
WELDER, 75 KVA Federal, M.D., Spot.
WIRE STITCHER, Morrison and Acme, M.D.

OVER 2000 MACHINE TOOLS AVAILABLE "IN STOCK"

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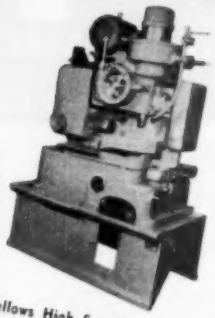

Type #7 Fellows High Speed Gear Shaper suitable for both spur and helical internal and external gears.

Reconditioned, fully guaranteed.

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THE FOCAL POINT FOR PRODUCTION MACHINERY

LATE MODEL MACHINE TOOLS . .

AUTOMATIC SCREW MACHINES
No. RA-4 1¼" Acme-Gridley, 1943
2" Model A Cleveland, 1942
1 1/16" Model "A" Cleveland, 1943
No. RA-6 9/16" Acme-Gridley, 1942

AIR COMPRESSORS
75 HP Gardner-Denver Air Compressor

DRILLS RADIAL
3'11" Archdale Radial (English), 1947

GEAR EQUIPMENT
No. 7 Gleason "Revex" Rougher, 1941
No. 6 Gleason Revacycle Generator, 1940
No. 12 Fellows H.S. Gear Shaper, 1942
10" Pratt & Whitney Hyd. Gear Grinder, 1942
15" Red Ring External Gear Lapper, 1942
No. 7 LS Fellows Gear Lapper, 1944
Red Ring Universal Gear Chucker, 1942
20M Fellows Red Liner Gear Tooler, 1942
No. 12 Gleason Tool Sharpener, 1943

GRINDERS CYLINDRICAL
16"x72" Norton Plain Type "C", 1941
14"x160" Norton Plain Type "C", 1942
16-20X30" Norton Plain Type "C", 1942
14"x48" Landis Plain Type "C", 1943
12"x96" Fitchburg Plain Hyd. 1942
10"x18" Landis Plain Type "C", 1940

GRINDERS INTERNAL
No. 72A3 Heald Plain Hydraulic, 1942
No. 24-36 Bryant Hydraulic, 1942
No. 16 CP 16 Bryant Hydraulic, 1942
No. 16-16 Bryant Hydraulic, 1942
No. 172 Heald Hydraulic, Gap, 1940
No. 6 Bryant Internal, 1940

GRINDERS RADIUS
No. 73 Van Norman Radius Grinder, 1942

GRINDERS SURFACE
No. 22 Heald Rotary 22" Chuck, 1944

GRINDERS THREAD
No. 10A Excello Internal Thread Grinder, 1943
No. 3I Excello Precision Thread Grinder, 1942

GUN BARREL MACHINES
No. ½Bx50 Pratt & Whitney Rifler, 1942
No. ½Bx30 Pratt & Whitney Reamer, 1942
No. ½Bx30 Pratt & Whitney Reamer, 1942

HAMMERS
No. 2B Nazel Forging Hammer, 1942
200 lb. Bradley Helve Hammer, 1942

LATHES ENGINE
16"x296" American Geared Head, M.D.
27"x192" Niles "Timesaver" Lathe, 2 Carriages, New 1941
27"x96" Niles "Timesaver" Lathe, New 1940
26"x180" Betts Bridgeford Lathe, New 1940
26"x96" Betts Bridgeford Lathe, New 1940
25"x120" Lodge & Shipley Gap Lathe, New 1940
25"x120" Oldfield Schofield, New
24"x120" Lodge & Shipley Cone.
14"x30" Bradford, 1942

LATHES PRODUCTION
No. 3FU Foster Fastermatic Plain Type, 1942
No. 5D Potter & Johnston Automatic, 1943
No. 4D Potter & Johnston Automatic, 1942
8"x84" Lo-Swing Semi Auto.
Lipe-Carbo-Matic Lathe, 1942

LATHES TURRET
24" Bullard Vertical, 1942
No. 3R Gisholt Universal Saddle Type, 1943
No. 4R Gisholt Universal Saddle Type, 1943
No. MS Libby Universal Saddle, Type, 1939
No. 5W Acme Universal Way Type, 1942
No. 4R Libby Universal Ram Type, 1942
No. 6R Denver Universal Ram Type, 1942
No. 3R Libby Universal Ram Type, 1942
No. 4 Gisholt Simplified, 1941
No. 1 Warner & Swasey Electric Head, 1940

MILLS TOOL ROOM
No. 4B Milwaukee Plain, M.D.
No. 3 Cincinnati Vertical, M.D.
No. 2G Kompsmith Universal, 1947
No. 2 Kompsmith Vertical Maximiller
ALS Alsera Plain Mill (No. 2 Size), New
No. 2 Rapid Universal Mill, New
FPN 2B Mathey Vertical Mill, New

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MUST MOVE PROMPTLY FROM LOCAL CUSTOMER'S PLANT

BEMENT MILES 18" SLOTTER with 3" dia. spindle. M.D.

GOULD & EBERHARD 36" Gear Cutter M.D.

BROWN & SHARPE #5—48" Gear Cutter, M.D.

BINSEE MACHINERY COMPANY HORIZONTAL BORING MILL. Table 30"x64". Quantity of boring bars.

CINCINNATI 60"x48"x14' Planer. 4 heads. 1 extra side head on massive floor stand for open side work. M.D.

B & O #2 Turret Lathe 1" Cap. M.D.

FOOTE-BURT #25—24" Heavy duty Vert. Drill #5 M.T. Motorized.

GRINDERS—CYLINDRICAL. B & S #11, 7"x 32". Plain Grinder. Table swivels. Motorized with 4 motors.

LANDIS 10"x36" Plain, M.D. Also Planer type Grinder 16"x36".

"BEMENT" 26" STROKE TRAVERSING HEAD SHAPER. 48" travel to rum. 2 tables. (PLANER SHAPER)

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OUTSTANDING MACHINE TOOLS

AUTOMATIC SCREW MACHINES
GYROMATIC Model 40 15/8" 6 spindle. Late
CLEVELAND 3½ Model A; Late Type.

BORING MILLS—Horizontal
FRANKLIN 4½" Bar; table type; M.D.
LANDIS #40, 4" Bar; floor type; M.D.
LANDIS #36 floor type; 3½" bar; M.D.
NILES 6" bar floor type, motor drive.

BORING MILLS—Vertical
BETTS 120" 2 heads P.R.T.; M.D.
BULLARD 8", 16" 6-spindle "A" Mult-au-matic
COLBURN 72", 2 heads PRT. M.D.
NILES 100", 2 swivel heads; motor drive.
NILES 53", 2 swivel heads, motor drive.

BRAKES & SHEARS
BESCO 14 gauge 60" Press Brake; NEW.
BESCO 14 gauge 72" Press Brake; NEW.
BESCO 36"", 20 gauge Power Sq. Shear; NEW.
BESCO 48", ⅛" gauge Power Sq. Shear; NEW.
BESCO 48", 16 gauge Power Sq. Shear; NEW.
BESCO 48", 14 gauge Power Sq. Shear; NEW.
BESCO 72", 14 gauge Power Sq. Shear; NEW.
BESCO 96"x¼" Power Sq. Shear; NEW.
BESCO 96"x¾" Power Sq. Shear; NEW.
CHAMBERSBURG 500 HP, Billet Breaker; late type.
JAMES RENNIE No. 8, Univ. Ironworker; late type.
NIAGARA No. 116 Squaring Shears; late type.
QUICKWORK No. 6 ¼" rotary, M.D.
QUICKWORK No. 6, 1" capacity; motor drive.
WORMSER T-15; T-25; Univ. Ironworker; NEW.

BROACHES
CINCINNATI 1-30 Duplex Vert. Hydr.
COLONIAL, V.G. 1-10-48; Vert. Hydr. late.
OILGEAR 3XA Horizontal Int.; Late.

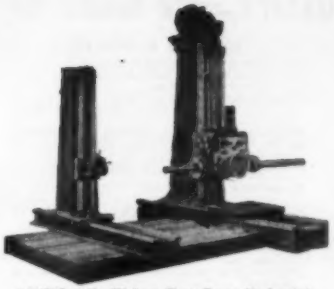
DRILLS—Radial
CINCINNATI BICKFORD 6'15" Univ.; M.D.
KITCHEN & WADE 3' arm 12" col. M.D.

DRILLS—Miscellaneous
AVEY No. 3, Ball bearing, Motor drive.
BAKER No. 217; Late.
BARNES No. 420 Deep Hole; late.
BARNES H-3 Hydram; hydr.; inverted; late.
BARNES H-2 Hydram; hydr.; M.D.
BARNES 20" 4-spindle Camel Back, Late.
BODINE #42-20 multi-univ., dial feed; M.D.
CINCINNATI 21", late.
FOOTE-BURT, 6-spindle, late type.
LeBLOND No. 2, deep hole, late type.
LEMAIRE, 5spindle, late type.
MOLINE 6-spindle Hole-Hog 2¼"; M.D.
NATCO No. 14 Mult.; Rect. Hd.; PRT; M.D.

GEAR CUTTING EQUIPMENT
BILGRAM 6" & 16" Bevel Gear Cutter, M.D.
BROWN & SHARPE 6-72" Auto. Cutter; M.D.
CROSS #1, #40, #45 Tooth Rounders; M.D.
DETROIT type GG-36 Gear Grinder; late type.
FELLOWS No. 4 Enveloping Gear Gen., M.D.
FELLOWS Nos. 61A, 6Z2, 75, 7, 7A, 72, 77 High Speed Gear Shapers; late.
FELLOWS 13-LS Lapper; late.
GLEASON #20 Tester Late Type.
GLEASON 25" straight dbl. gear gen.; M.D.
GLEASON #13 bevel cutter-grinder. M.D. late
GLEASON 18" bev. gear Tester & Lapper; M.D.
GLEASON #6 Revacycle. Late type.
GLEASON No. 12 Tool Sharpener; late.
GLEASON 12" Straight Bevel Gen.; late.
GLEASON #4 & #6 Tester, Late Type.
GLEASON 10", 11" & 18" Bevel Gear gen.
GLEASON 24", 37", 77", 96" Bev. Gear Planer
GLEASON No. 14 Hypoid Grinder; late.
MICHIGAN Gear Finisher, Model 862-24-A, 24" cap. Late Type.
PRATT & WHITNEY 10" Gear Grinder; late.

GEAR HOBBERS
BARBER COLMAN 12# Motor Drive.
BARBER COLMAN Type A; Late.
GOULD & EBERHARDT #8H; Late.
GOULD & EBERHARDT #18H, Motor Drive.
GOULD & EBERHARDT #36 H; Late.
GOULD & EBERHARDT #36BM 3 spindle Auto. Rougher; M.D.
KOEFFER WM-11 Auto.; bench type; Late.
PFAUTER RS1; Max. dia. 30" late.

GRINDERS—Plain Cyl. & Univ.
BROWN & SHARPE #6 Pl. Cyl.; late.
CINCINNATI 14x72 Model EM Plain, Late.



LANDIS #40, 4" bar, Floor Type, Horizontal Boring, Milling and Drilling Machine.

LANDIS 16x36" Type C Plain, Hydr. Late type.
LANDIS 10x36" Type C Plain, Hydr. Late type.
LANDIS 10x18" Type C; late type.
LANDIS 4"x12" Type H, Plain; Late.
LANDIS 30"x240" Plain cyl. M.D.
NORTON 10x72; type C; plain; M.D.
NORTON 10x120; plain; M.D.
NORTON 14x50" plain; late.

GRINDERS—Surface
ARTER 8" Rotary, M.D.
BILLITTER & KLUNZ 48"x196" Way Grinder.
BLANCHARD #16 Hi Power Vertical; Late.
HEALD #22 Rotary, 12" chuck; m.d. Late.
PRATT & WHITNEY 14x36" Model B, Late.
THOMPSON 2V Special; late type.

GRINDERS—Miscellaneous
BRYANT No. 3 Internal; hydraulic; late.
BRYANT No. 6 Internal; hydraulic; late.
BRYANT No. 16-C-16 Internal; hydraulic; late.
BRYANT No. 16-CF-16 Internal; hyd.; late.
BRYANT No. 24 Internal; hydraulic; late.
EXCELLO #48 Carbide Late.
HEALD 75A, special internal; late type.
HEALD No. 72A-5 "Gagematic" Int.; Late.
HEALD No. 72-A-3 "Gagematic" Int.; Late.
HEALD 72-A-3, 72-A-5 Plain; motor drive.
HEALD No. 78 Internal Centerless; M.D.
LEMPCO 22x72" Mod. KG Crankshaft; Late.
VAN NORMAN 666 Crankshaft Regrind.
VAN NORMAN 639 Osc. type Radius; Late.

HEADS AND UPSETTERS
ACME 2" Model XN, late type.
AJAX 3½" Upsetter, motor drive.
MANVILLE #2 DSOD, Motor Drive.
MANVILLE #2 DSOD, Motor Drive.
MANVILLE #1A DSSD, Motor Drive.
WATERBURY FARREL #11, DSSD, M.D.

LATHES—Engine & Mfg.
AMERICAN 36x32" centers geared heavy.
DENHAM 16x48" centers, Gap; late type.
DENHAM 12x54" centers, Gap; late type.
DENHAM 16x72" centers, Gap; late type.
GRAHAM NORMANTON 12"x48" centers; late.
HENDEY 12"x54" centers, belted motor drive.
JONES & LAMSON "FAY" 20x28" Auto. Late.
LEHMANN 16"x30" Hydratrol; late type.
LEHMANN 25x96" centers; Timken; grvd. M.D.
LeBLOND 16x36" center; Auto.; Timken; late.
LeBlond Mod. 7ACL Crankshaft; M.D.
LODGE & SHIPLEY 14"x30" Centers, late type.
LODGE & SHIPLEY 16"x30" Centers, late type.
LODGE & SHIPLEY 24"x96" centers; Late.
LODGE & SHIPLEY No. 6—24" and 96" centers DUOMATIC Timken; Late.
LoSWING 4x60", 8x24", 9x108"; late.
MONARCH 14"x42" type Z, Magnamatic; late.
NILES 30"x46', 30"x50' Boring; "Time-Saver"; Timken; Late.
PORTER CABLE 9x14" High Speed; Late.
PORTER-McLEOD 16"x6'; NEW.
PORTER-McLEOD 16"x8'; NEW.
PRATT & WHITNEY 16"x30", Timken; late.
REED-PRENTICE 14"x54", Timken; late type.
SPRINGFIELD 16"x30" Centers, Timken; late.
SPRINGFIELD 14'x42", geared; M.D.
SUNDSTRAND 10x60" Auto. Late Type.
SWIFT 16"x72" Centers; M.D. Late.
SWIFT 20"x120" Centers; late.

LATHES—Turret
MOREY No. 2 ram type TIMKEN.
GISHOLT 1L, Saddle type, M.D.
MAGDENBERG Model MWF-BG-250 Univ. table type; P.R.T.; 12" hole through spindle; cross sliding turret; M.D.; Late.
WARNER & SWASEY 4-A, Timken Bearing, 7½" Bore, motor drive.

MILLING MACHINES—Pl. & Univ.
BROWN & SHARPE #2B Timken M.D.
CINCINNATI #2 Plain, hi power Timken; M.D.
KEMPSMITH #2 Timken; Univ. M.D.
CINCINNATI 6-48,4 spindle, Tracer; Late.
ROCKFORD Rigid-Mill #3 M.D.
STARR No. 2, table 13"x65"; late.
RICHMOND #2, light, late type.

MILLING MACHINES—Mfg.
CINCINNATI O-8 vertical; late.
GOULD & EBERHARDT 25 Cont. type; M.D.
INGERSOLL 32x24x18' Planer Type; 2 hds.
INGERSOLL 30x24x12' Adj. Rail Slab, M.D.
SUNDSTRAND Mod. 3A Duplex 42" feed, M.D.
TAYLOR & FENN M-80 Duplex Spline; Late.

MILLING MACHINES—Thread
HALL Style D Planetary, Late Type.
LEES BRADNER HT 12"x54", M.D.; Late.
LEES BRADNER HT 12"x36", M.D.; Late.
MOREY 12x30" centers, 12x120" centers, late.
PRATT & WHITNEY 4½x12 Mod. C; late.

PLANERS
BETTS CONSOLIDATED 108"x84"x44', 4 heads; PRT; Box Table; M.D.
GRAY 24x24x6'; motor drive.
GRAY 36"x36"x10', 4 heads, PRT; Late.
LIBERTY 144"x76"x48" adj. variable, openside, box table; 4 heads, PRT; M.D.
NILES 108"x84"x42", 4 heads; Rapid Traverse; Box Table DC; M.D.
NILES-BEMENT-POND 72"x72"x30', 4 heads; Rapid Traverse; M.D.
NILES-BEMENT-POND 60"x60"x12', Rapid Traverse, 2 swivel heads, box table, M.D.

SAWS
CAMPBELL #401 Abrasive cut-off, Late.
ESPEN LUCAS No. 670 36" cap. Hydr.; Late.
GROB OS-20 metal band saw & fiber; Late.
HELLER Model SS- 6 1/4 Cap Cold Saw.

SHAPERS—Slotters
DILL 18" Slotter; motor drive.
PRATT & WHITNEY 6" Vertical; M.D.
PRATT & WHITNEY M 1251 10" Vert., M.D.
LYND FARQUHAR 26" Openside; M.D.
NEWTON 15" Slotter; M.D.
ROCKFORD 20" Vertical, Hydr.; Late Type.
ROCKFORD 24" Hydraulic; Late Type.

PRESSES
BESCO EB 2 Power Punching; NEW.
BESCO EB 3 back flywheel; NEW.
BESCO B-4; back flywheel; NEW.
BESCO No. 18, 10-ton OBI; NEW.
BESCO Mod. 21 Incl. 40 ton, 2" stroke; NEW.
BIRDSBORO 225 ton Vert. Hydr.; Late.
BLISS #6 SS DC 135 ton; 34"x95" bed; 2½" stroke; 60 SPM.
BLISS No. 410A Toggle Drawing; tie rod; steel gearing.
BLISS No. 2½A geared toggle; dble. acting.
GLEASON 15" Quenching; hydr.; M.D.
HANNIFIN 6-ton, 16-ton; hydr.; Late.
HANNIFIN 16-ton Hydraulic; late type.
NATIONAL #5 H.S. Maxi-Press (Forging).
SENTINEL 25-ton OBI; NEW.
SHORE, 500 ton Hydr. Flanging & Forging.
TOLEDO #93 Straight Side DC 113 ton; 33"x 104" bed; 2" stroke; 70 SPM.
WATERBURY Farrel 125 Ton; St. Side.

MISCELLANEOUS
BAKER #5 Keyseater; motor drive.
BARNES No. 172, 214 Honing; hydr.; Late.
BAUSCH #1 Radial tapper; late type.
CROSS #45 Tooth Gear Chamfering Machine.
FISCHER No. 1, Oil Groover; Late.
GROB OS-20 Metal Band Saw—Filler; M.D.
HUGH SMITH 1"x24'6" Plate bend. rolls M.D.
LeBLOND No. 2 Barrel Rifling Machine.
MANVILLE #2C Screw Slotter; Motor Drive.
MANVILLE #1 Screw Slotter; Motor Drive.
LANDIS 2" Dble. Spdle. Threaders; M.D.
LeBLOND #2 Barrel Lapper; M.D.; Late.
MICHIGAN #884 Gear Shaver; Late.
MANVILLE No. 3 Trimmers; Late.
MANVILLE No. 3C Thread Roller; M.D.
SAUNDERS 8-18" Pipe Machine; M.D.
US TOOL 310-B Cutter Reliever; Late.
WATERBURY FARREL No. 11 Thread Roller.
WEYBRIDGE Slitter; 36x22 gauge; NEW.

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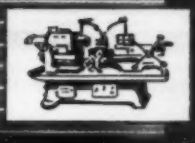

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Bundstrand Rigidmill, m.d., vertical spindle
No. 0B Cincinnati, m.d., late
No. 3V Toledo, s.p.d.
No. 5 Becker, cone
Newton Vertical Miller, rotary table
54" Ingersoll Single Spindle Adjustable Rotary Mill, m.d.

MILLING MACHINE ATTACHMENTS
18" Cincinnati Circular Milling Table, p.f.
Kearney & Trecker Attachment for Milling Bridge Roomers, 62" long x 24" wide
1½" Cincinnati Rack Mill, Attach. for No. 3 Dial Type Miller
Vertical Attach. for Milwaukee Mfg. Type Miller
Cincinnati Vertical Attach. for use on latest type No. 2L or 2MH rectangular overarm Millers
18" Kearney & Trecker Rotary Table, p.f.
16" Cincinnati Rotary Table, p.f.
20" Rotary Table for 4M Milwaukee Vertical Miller
Rack Cutting Attachment for No. 4 Cincinnati High Power Miller, s.p.d.
30" Cincinnati Power Feed Rotary Table

PIPE MACHINES
2" Bignall Pipe Machine, cone
2" Forbes Type Curtis & Curtis Pipe Machine, m.d.

PRESSES
Fast Feed OBI Punch Press, #1900BI, 15 ton, 2" stroke, m.d.
Chambersburg 35 ton Hydro Pneumatic
Springfield No. 1 Straightening Press
No. 4 Verdin, Kaspon & Verdin O.B.I. Press
Niagara OBI #A2 Punch Press, 18 ton, 1⅝" stroke, m.d.

PUNCHES & SHEARS
No. 2 Hilles & Jones Horizontal Punch, m.d.
No. 0 Long & Allstatter Single End, m.d.
No. 7 Thomas Vertical, latest
Pedrick & Ayer Pneumatic, 0" throat
#10 Kling Single End Punch, 48" depth of throat, m.d.
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Cleveland Shear, 72" gap, 15" blade, will shear 1910 —1" plate
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P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
28"x29"x5' Whitcomb-Blaisdell Planer, 1 head, m.d.
24"x24"x5' G. A. Gray Planer, belted m.d., 1 head on cross rail
24"x24"x6' G. A. Gray Planer, belted m.d., 1 head on cross rail
30"x30"x6' Cincinnati Double Housing, 2 rail heads
30"x30"x10' Cincinnati, belted m.d., 2 heads
36"x36"x10' Betts, belted m.d., 2 heads on rail, 2 side heads
36"x36"x10' Niles, reversing m.d., 2 heads on rail, 1 side head
36"x36"x18 Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
36"x36"x24' Cincinnati, belted m.d., 2 heads
38"x38"x12' G. A. Gray, 2 heads
42"x42"x26' G. A. Gray, 2 heads, belted m.d.
48"x48"x14' Woodward & Powell, 4 heads
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, reversing m.d., 4 heads
48"x48"x30' Cincinnati, 4 heads, m.d.
54"x48"x14' Cincinnati, 4 heads, belted m.d.
72"x72"x24' Betts, m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
84"x72"x30' Niles, reversing m.d.

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48" Niles-Bement-Pond Car Wheel Borer, m.d.
52" Betts Car Wheel Borer, late
90" Niles Balanced Quartering & Crank Pin Turning Machine, late
4 Burnished Rollers for use on above machine
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90" Niles Driving Wheel Lathe, m.d., late
Niles-Bement-Pond Quartering Machine, m.d., new

SAWS
5" Newton Cold Cut-off Machine, s.p.d.
No. 3 Nutter & Barnes Cold Saw
No. 6 Castman Bly Cold Saw
No. 136 Espen Lucas Cold Saw, m.d.
Gustav Wagner Cold Saw, m.d.
7½ H.P. Cincinnati Elec. Tool Co. Abrasive Cut-off Machine, type JCAW, model 102
New Heller Hydraulic Cold Saw, Model SSH-260, complete with elec. equipment
Kalle Heavy Duty Steel & Metal Bandsaw, Model BSM 40, new
Racine Power Hack Saw, 6x6"

SHAPERS
24" Gomco, m.d., latest
24" Gould & Eberhardt Crank Shaper, m.d.
24" Potter & Johnston, cone
28" Gould & Eberhardt, m.d.
32" Cincinnati Back Geared, cone, motorized
32" Morton Draw-Cut, m.d., late
32" Ohio, m.d.
36" Morton Draw-Cut, m.d., late

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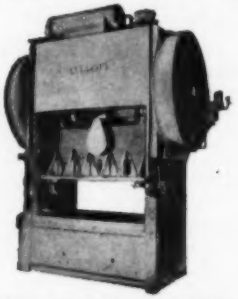

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#61A Fellows Gear Shaper, Ser. #25804
5' American Radial Drill Ser. #38502
Lodge & Shipley Lathe #29061 18" Jaw Chuck Rood Prentice Engine Lathe
60" Hasselett Face Grinder
6D Potter & Johnson Automatic Chucking Machine
#30 Waterbury Farrell Thread Rollers
16" Gould & Eberhardt Shaper
(2) #3 Cincinnati Miller-Ser. A1604 & B
5' Rood Prentice Radial Drill Serial #5121
Gearad Pin Router—Serial #3825
Hendrickson Cam Miller and Motor
#32 Lucas Precision Horizontal Boring Mill Serial #32-18-21

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Lathe, 60"x25' centers, Machintosh-Hemphill.
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Press, Trimming, No. 6 W & W, 225 ton.
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Shear, 1/4"x1/4" E. W. Bliss. #6 H&J Vertical Bar.

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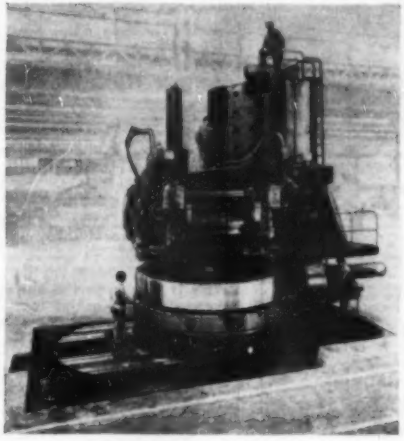

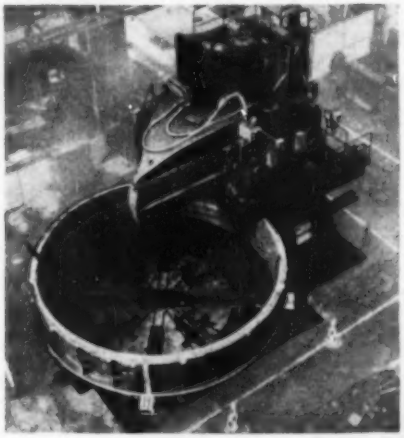

The above pictures show the Berthiez Type 9040 Machine with turning capacity to 23 feet. One picture shows the sliding rotary table extended, the other picture shows the table close to the column. This unique design gives our machine a greater rigidity than that of any of the double upright machines. Machine pictured available for October 1952 delivery.

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LeBlond 14"x8', 4 SCD, loose change gears.
American 16"x14' American G.H. Lathe, complete with taper attachment.
Monarch 24"x12' G.H. Lathe, complete with taper attachment.
American 30"x40' bed, Internal Face Plate Drive, 33" centers, 2⅞" hole in spindle.
American 28"x16' bed G.H., 12 spindle speed, taper attachment.
American 24" x 12' bed 3 SCD, motorized.
Lodge & Shipley 16" x 12'0" centers G.H., Timken bearing, drop lever handles in apron, late type.
Bradford 20"x18' bed, 4 SCD, 12' centers
Lodge & Shipley 20"x8' bed, single pulley
LeBlond 17"x8' bed, 3 SCD
American 18"x8' bed, 3 SCD, bowl head
Lodge & Shipley 16"x8', single pulley
LeBlond 15"x8' G.H., 9 spindle speeds
Lodge & Shipley 14"x6', 3 SCD
American 14"x8', 3 SCD bowl head
American 36"x12', 3 SCD Lathe, 6' centers.
LeBlond 27"x10', 3 SCD Lathe, 3'11" centers.
American 24"x18' Lathe, vee-belt drive, 13' centers, 12 spindle speeds.
Boye & Emmes 20"x10', G.H., complete with taper attachment.

BORING MILLS—Vertical

Niles 30"-44", 1 rail and 1 side head.
Niles 42"-50" Driving Box Borer, Burnisher and Facer, motor driven, late type.
King 42", motorized, 2 heads on rail

GEAR MACHINERY

Gould & Eberhardt 96M Gear Hobber
Gould & Eberhardt 60BM Gear Rougher
Gould & Eberhardt 36M Hobber
Fellows 612 Spur Gear Shaper
Fellows 725 Gear Shaper, with spur guide
Brown & Sharpe 4-48 Gear Cutter
Brown & Sharpe 3-26 Gear Cutter

GRINDERS—Cutter & Tool

Oliver Template Tool Bit Grinder, late.
Sellers 4T Tool Grinder, late type
Sellers 6T Tool Grinder, late type

GRINDERS—Internal

Heald 78 Centerless, Internal & Cylindrical, late type
Heald #50, tight & loose pulley
Heald #72A, new 1941
Heald 72A3 Plain Internal Grinder, late type.

GRINDERS—Cylindrical

Landis 10x18 Type C Plain, late type
Landis 26"x108" centers Plain, arranged for motor drive with motors, 10 speeds 5 to 62.
Landis #2 Universal, 12"x35" centers, belt drive.
Cincinnati #2 Universal, belt drive, 12x48.
Cincinnati 16x96 Plain Cylindrical, swings 32" in gap
Landis 10"x72" Plain Cylindrical

GRINDERS—Thread

Jones & Lamson 8x31, late type

MILLERS—Plain

Brown & Sharpe #3, 4 SCD
Cincinnati #3 Dial Type Miller, motor in base.
Kempsmith #2, 4 Step cone drive, single back geared.

MILLERS—Universal

Cincinnati #4, single pulley drive, 16 speeds.
LeBlond 2½ Heavy Duty, 3 SCD, motorized

DRILLS — Radial

Cincinnati-Bickford 5'13" Radial Drill.
Fosdick 6'18" Heavy Duty Radial Drill.

PLANERS

Cincinnati 24x24x8' Double Housing
Liberty 16x16x10 Double Housing
Niles 48"x48"x16' Double Housing, 4 heads, box table, DC reversible drive.
Niles 84"x84"x16' Double Housing, 4 heads, box table, DC reversible drive.
Bement-Niles 10'x10'x20' Double Housing, 2 rail and 2 side heads, with all electrical equipment.

SHAPERS

Smith & Mills 14" Plain Crank, Lima drive
Gould & Eberhardt 16" B.G., gear box
Barker 16" B.G., 4 SCD
Averbeck 21" B.G., 4 SCD
Cincinnati 24" B.G., 4 SCD
Gould & Eberhardt 24" B.G., gear box
Smith & Mills 25" B.G., 4 SCD
Columbia 26" B.G., gear box drive
Gould & Eberhardt 28" B.G., gear box
Gould & Eberhardt 32" B.G., gear box
Smith & Mills 32" B.G., gear box drive

ROLLS

Bertsch 8'x⅝" Initial Type, As variable speed motor drive.

MISCELLANEOUS MACHINERY

H&G Model 1-K Threading Machine, late
Taft Pierce Beach Center, 3"x48" centers
Hoffman Heavy Duty Portable Cleaner
Model #22 Rodgers Hand Truck Press

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Landis #40—Floor Type—4" bar—Outboard support—54" vert. traverse—MD
Detrick & Harvey #2—Floor type—Outboard support—Universal table—60" vert. traverse—MD

BORING MILLS—VERTICAL

Bullard 42" and 54" Spiral Drive—Side heads—4 jaw chuck tables—MD
Niles 53"—42" under cross rail—36" under tool holders—2 swivel heads—MD
Betts 8'—Swing 108"—2 swivel heads—69" under cross rail—MD
Cincinnati 10'—2 swivel heads—Massive type—124" swing MD
Bullard Model 3-11 Mult-Au-Matic—Lead screw type—Double indexing—Considerable tooling—Late type—MD

RADIAL DRILLS

Fosdick 5'14"—Box table—Tumbler gear box—MD
Cincinnati-Bickford 7'22" Master Type—Box table—Straight base—24 speed head—AC MD

GRINDERS

Norton 10"x18" Type C Plain Mechanical—Center grinding attch—MD—1942 machine
Landis 14"x36" and 14"x72" Universal—3-motor drives—Late types
Cincinnati 6"x30" Plain Hydraulic—Saddle type—Filmatic bearings—MD—Late type
Heald #25A Rotary Surface—30" chuck—34" swing—MD—Late type
Norton #2 Hydraulic Universal Tool & Cutter—Cap. 12"x28"—MD—Late type
Cincinnati #3 Centerless—Ball bearings—Cap. to 6" dia.—MD

LATHES

Hendey 14"x30" ctrs Geared Head—Taper attch—Motor-in-base—Late type
Reed-Prentice 16"x8' Geared Head—Taper attch—Motor-in-base—Late type
Lodge & Shipley 24"x12' Geared Head—Taper attch—Threading dial—MD
Betts-Bridgeford 36"x30' Geared Head—21' 7" ctrs—MD
Cincinnati-Acme 4½"x12" Universal Turret—Timken bearings—Arr. bar and chucking—MD

SPECIALS

Bertsch 1⅝"x18' Pyramid Type Bending Roll—Drop end—100 HP main and 20 HP adjusting motors—1944 machine—Used very little
Bullard 30"x20" Man-Au-Trol Boring Unit—Table 32"x40" — Positions 260 holes at one setting — Hydraulic operation—Very late type

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Fellows, #72 Gear Shaper, High Speed, Type 7, Serial No. 21348, Motor and controls 220/440. Reconditioned.

Bryant, #16-CP-18" Hydraulic Hole Grinder, Serial No. P-6831, Mfg. 1943. "C"—Heavy Duty; "P" — Plain Bearings on Work Spindle.

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AUTOMATIC

1⅜"-8 Conomatic, MD., 1943.

GRINDER

#33 Excello Thread Grinders with motors, cam dresser and taper.

LATHES

Reid-Prentice 14"x30", 16-speed G.H.
Monarch 12"x30" Model CK., G. H.

MILLER—Prod.

1-18 Cincinnati 50-1500 rpm. 1M. Kent Owens.

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⅞" G Model Gridley
1-1/16" Model A Cleveland (1942)
1½" Foote Burt (1941)

DRILLS

1 Spdl—15" Sw—No. 2 Avey, Cam Fd.
1—Spdl—24" Sw—No. 2 MA6 Avey
2 Spdl—24" Sw—No. 2 Aveymatic
2 Spdl—24" Sw—No. 3 Avey
D-31 Fox Multiple Drill, No. 2 Taper.
6' Western Radial

GEAR MACHINES

No. 12-H Gould & Eberhardt Hobber
No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl. Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.

BORING MACHINES

72" Niles—Hvy. Pattern

GRINDERS

6"x18" Norton Cylindrical (1943)
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x50" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
16"x120" centers
16"-40" gap x 120" centers
18"x96" centers
18"-30" Gap x 96" centers
20"x96" centers
24"-32" Gap x 144" centers
No. A-3—12" Arter Rotary Surf.
5A Bryant Internal
5B Bryant Internal
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 71 Heald Centerless Internal
No. 81 Heald Int. Cen.-Sizematic
No. 74 Heald Internal Centerless
No. 44 Excello Carbide Tool Gdr.

LATHES

19"x8' LeBlond Hvy. Duty Lathe
36"x18' Putnam Grd. Hd., M.D.
No. 4 Warner & Swasey Tur.-Bar Fd.
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 4A Warner & Swasey—7⅛" Hole —Spdl.

MILLING MACHINES

6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Gray, 2 hds.
48"x48"x12' Cincinnati; 2 hds.
48"x48"x12' Gray Maxi-Service
48"x60"x27' American, 4 hds.

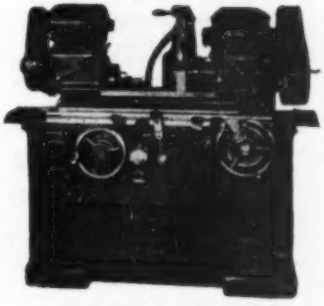
MISCELLANEOUS

2—12"x96" Magnetic Chucks
20'x1" cap Southwark Roll
14'x⅝" cap Niles-B-Pond Roll
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
No. 0 Bakewell Tapper
No. 200 Micro. Horiz. Hone, 1 Spdl.
No. H-2 Micro. Horiz. Hone, 2 Spdl.
Model 200—H5 Micro.—Horiz.—2 Sjdl.
14' Niles-Bement-Pond Roll
No. 6 R & K Straight-side Press, M.D.
42"-16 Ga. Economy Shear, M.D.
4-B Marvel Hack Saw
No. 5 Reynolds Power Screw Driver
No. 175 G. T. Schmidt Marking Mach.

Attention!

OF SPECIAL INTEREST

6" x 18" Norton Hydraulic Plain Cylindrical Grinder



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ENGINE AND PRODUCTION LATHES

1—14" x 54" centers MONARCH Tool Room Lathe, geared head, new 1939/40, taper attachment

1—unused HEID 17" x 78" centers Heavy Duty Engine Lathe, new 1951.

1—30" x 14' bed AMERICAN TOOL WORKS Heavy Duty Engine Lathe, taper attachment

24—No. 8 SUNDSTRAND Automatic Lathes, new 1942-1944, 8" x 21" capacity.

7—No. 4 GISHOLT Second Operation Production Forming, Facing and Cut-off Lathes, new in 1947/48; with front and rear slides, hydraulic chucking, spindle hole 4½".

2—20" x 25" FAY Automatic Lathes, 1939/40.

1—Model U SENECA FALLS LO-SWING 14" x 24" Automatic Lathe, new in 1940.

TURRET LATHES

1—Model No. 4H-8 LIBBY Heavy Duty Saddle type Turret Lathe, new in 1940, 8¼" hole thru spindle, 32" swing.

1—36" BULLARD spiral drive Vertical Turret Lathe, new 1940.

AUTOMATICS

1—Model A 9/16" CLEVELAND Single Spindle Automatic, new in 1943.

1—Model A 1-1/16" CLEVELAND Single Spindle Automatic, new in 1940.

1—Model B 1½" CLEVELAND Single Spindle Automatic, new 1943.

1—No. 60 NEW BRITAIN-GRIDLEY 1" Six-spindle Automatic Screw Machine, new 1941; with universal threading spindle, various tooling.

PLAIN & UNIVERSAL MILLING MACHINES

1—#2G KEMPSMITH Universal Mill, new 1947 with universal dividing head.

1—No. 12 VAN NORMAN Ram Type Universal Mill, new in 1947.

1—Model 3VG High Speed REED PRENTICE Vertical Mill and Die Sinker, new 1940.

CYLINDRICAL GRINDERS

1—10" x 18" NORTON type "C" Plain Grinder, 1942; with mechanical table traverse.

1—12" x 36" Type LC Norton Universal Grinder, new 1941

1—14" x 48" CINCINNATI Self-contained Plain Grinder, 1940; with filmatic bearings.

INTERNAL GRINDERS

Several—No. 5B, No. 16 & No. 24 BRYANT Internal Grinders.

1—Model No. 72A-5 HEALD Precision Toolroom Internal Grinder; 1942; with cross sliding headstock.

3—No. 172 HEALD Hydraulic Internal Gap Grinders; new 1941/42; cross sliding and swivel workhead, swing in gap 40".

SHAPING MACHINES

1—16" SMITH & MILLS heavy duty Shaper, new 1946.

1—32" GOULD & EBERHARDT heavy duty Shaper.

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AUTOMATIC, 1¾" 4 spin, Gridley Model G
BOLT THREADERS, 1½" Williams Reliance
BOLT THREADER, 2" Landis, 2 Hds., M.D.
BORING MILL, 100" Cincl. Massive, 2 Hds., M.D.
BORING MILL, 80" Colburn PRT, 2 Hds. M.D.
BORING MILL, 72" King, 2 Hds., P.R.T., M.D.
BORING MILL, 5" bar Betts Floor Type, with 9'x18' plate
BORING MILL, 4½" bar P. & H. #9 Floor Type
BORING MACH., 5" Bar Lucas & Lambert (2)
DRILLS, RADIAL, 4' Western, M.D. (2)
6' Amer. 15" sqi. Trip. Purp., M-on-arm
5' Amer. 15" sqi. Trip. Purp. M-on-arm
5' Niles #10 Rightline, Univ., Motor on arm
5' Amer. 14" sqi. Trip. Purp.
TABLES, RADIAL, 30"x28"x29"
DRILL, 24" Cincl. Bick., Tapping, M.D.
DRILL, No. 121 Baker, M.D.
DRILL, 16 Spin. Natco, C13-R
DRILLS, 21" Rockford Excelsior M.D. New
GEAR HOBBER, No. 12 Barber Colman
GEAR HOBBER, No. 96M Gould & Eberhardt
GEAR PLANERS, 10" Rienecker Bevel
GEAR SHAPERS, Nos. 5, 64A, 64 & 81A
GEAR SHAPER, No. 75 Fellows
GEAR CUTTER, Nos. 13 B. & S. Spur & Bevel
GRINDER, FACE, 24" Builders, 40 h.p.
GRINDER, Micro Internal, large capty.
GRINDER, No. 75A Heald Internal
GRINDER, SURFACE 14"x36" P. & W.
GRINDER, No. 6T Sellers Tool 1942
HAMMER 1000 lb. Chambersburg Pneumatic, 1947
KEYSEATER, No. 3½ Baker, 24" Str. x 4" wide, M.D.
LATHES, 48"x20' bed, Amer. T.A. Grd. Hd.
26-48"x24' bed McCabe, Dble. Spin. M.D.
24/46"x16' bed Fay & Scott Gap M.D.
36"x22' cen. Bridgeford, 2 rests, M.D.
32"x14' bed Shumacher Boys T.A., M.D.
24"x12' bed B. & E., T.A., Grd. Hd.
16/32"x8' Harrington Gap M.D.
18"x10' bed L. & S., T.A., Cone Motorized
18"x8' bed L. & S. Selective Grd. Hd., M.D.
16"x6' & 12"x6' Hendeys (2)
14"x30" cen. Monarch T.A., 16½" sw.
14"x6' bed, Amer. T.A., M-in-base
TURRET LA., 21" Acme Universal Brass, late
TURRET LA., 10" Libby Model A Grd. Hd.
No. 2B Foster Univ., 3" capty., Bar Timken
No. 1B Foster Univ., 2" capty. M.D.
No. 00I Oster 1½", New
No. 14L Gisholt, 60" H.S.
No. 3 Gisholt, '42 (5)
MILLER, No. 5-48 Cincl. Hydromatic Pl. M.D.
THREAD MILLER, 12"x60" Morey Shields '42
MILLER, No. 4B B. & S. Plain M.D.
MILLER, No. 0 Sundstrand Rigidmil, Hand
MILLER, No. 1½B K. & T. Univ., Grd. Hd.
MILLER, No. 3 Cincl. HI Power, Motorized
MILLER, No. 4 Cincl. Univ. HI Power, M.D.
MILLER, No. 30H Sundstrand Rigidmil, 33" feed
MILLER, No. 2 Van Norman Ram, M.D.
MILLER, No. 2 Van Norman, Late
MILLER, No. 12 B. & S. Prod., Late
PIPE BENDER, 4" American, M.D.
PIPE THREADER, 2" Landis, Grd. Hd., M.D.
PRESS, 60 Ton Henry & Wright Dining
PRESS, 75½ Bliss S.S., 6" stroke
PRESS, No. 58 Toledo S.S., Grd., 171 ton capty.
PLANER, 24"x24"x5' Gray, M.D.
SHAPER, 24" Kelly, M.D., Late
SLOTTER, 24" Betts, 40" Table, M.D.

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10 x 18 cin. O.D. grinder, plunge cut, late.

3 spindle Avey drill, motor spindle PF and tapping.

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Cincinnati type tool and cutter grinder—new.

No. 11R W. & S. 2 spdle. Radial Arm Tapping Machine.

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NILES 10' Vert. Boring Mill, 2 Heads, M.D.
INGERSOLL Planer Type Mill, 4 Heads, 36" x 24" x 20'
CINCINNATI 36" x 36" x 16' Planer, M.D.
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HEALD #22 Rotary Surface Grinders

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AUTOMATIC—1-1/16" Foote-Burt Single Spindle
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AUTOMATIC—⅝" Cone Swiss Type
BROACH—4T24 American Vertical
DRILL—#3B12 Edlund 4 Spindle
GEAR GENERATOR—12" Gleason Straight Bevel
GEAR SHAPER—#212 & 7125 Fellows Hi-Speed
GRINDER—No. 214-30 Besly Disc
GRINDER—#1 Reteron Univ. Cylindrical
HOBBER—#155 Cleveland Rigid Hobber
LATHE—16"x8' South Bend Toolroom
LATHE—16"x24"x8' South Bend
LATHE—17" LeBlond Rapid Production
MILL—No. 1-12 Cincinnati Plain Horizontal Prod.
MILL—#MMI- U. S. Multi Mill
PROFILER—#12B Pratt & Whitney 2 Spindle, raised
ROUTER—No. AIRR Onsrud Double Arm, 84"
TAPPER—#10 Warner & Swasey Precision
THREADER—#22 Murchey Bolt, Lead Screw
TURRET LATHE—#2G Morey Hand Screw Mach.
TURRET LATHE—#5 Gisholt Univ., Bar & Chuck

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7D—Jones & Lamson Turret Lathes, Serial #61474 —61492
8D—Jones & Lamson Turret Lathe, Serial #61700
42A Heald Borematic, Single end, 2 heads, Serial #9346
49A Heald Borematic, Single end, 1 head, Serial #5409
1006 Libert H.S. Shaer 10 ga. 36" throat
No. 340 Ohio Superfinisher
#1 Sundstrand Vert Hyd Production Mill, Serial #31-1139
100 ton Clearing, St. 17", Sh. 19", Bed 44"x36"—made in 1942
8" Red Ring Gear Shaver, Serial #GCC-298
4"x36" Seneca Falls Lo Swing, Serial #16652
10"x10" Rasmussen Hack Saw, Automatic Feed.
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VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

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FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
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ALLEN: #2 High Speed, 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Reaming Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers, Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
LIDKOPING: Centerless (New)
NORTON: 10"x36" plain, hydraulic
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
BRYANT: 16C16 Hole, Hydraulic
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—SURFACE

ARTER: A-1—8" Rotary
HEALD: 8" Rotary
HEALD: No. 22 Rotary—12" Chuck
THOMPSON: Surface Grinder, Hydraulic (New)

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"

HONING MACHINES

BARNES: No. 306H Vertical 24" Stroke
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical
NORTON: 2Fx40" dia., for flat work

LATHES—PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
Reinecker Relieving Lathe (new)
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LE BLOND: Regal, 15" swing x 42" centers
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers
PROGRESS: Geared head 16" to 30" swing (New)
TRIPLEX: 14" dia. x 40" centers Toolroom Lathes (new)
VDF New Engine Lathe 49" swing x 20' centers
VDF New Engine Lathe 27" swing x 23' centers

LATHES—TURRET

WARNER & SWASEY 2A Turret Lathe
WARNER & SWASEY #3 Turret Lathe
HERBERT: #2, #4, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

CINCINNATI: 2-spindle Vertical Hydrotel with two rotary tables of 36" dia.
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

PRESSES

Gen. FLEX: Screw Press, 3 ton

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
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RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
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HERCULES: 16" & 22" Shapers (New)
KLOPP: 16" to 26½" Shapers (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: 40A Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former.
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

CUT-OFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
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CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
PRESS: Screw. Gen. Flex. 3 ton
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LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
PUNCH SHAPERS: Sentinel Shrewbury, Thiel type design (New)
SHAPERS: Klopp 16 to 26½" (New)
SHAPERS: Hercules 22" (New)
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Baird, Chucker, 6-Sp., 6½" Work Rotating, #76H
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Cone, 4-Sp. 1½" Vertical Cut-Off (Latest)
Gess & DeLeeuw, 6 c 6⅛"
New Britain, 6-Spindle 1", #60 (Late)

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American, 15-Ton 52" Stroke, Horiz. Dble. Back
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Bullard, 42" Vert., New Era Type, Side Head
Rogers, 36" Vertical, 1 Turret Head and 1 Side Head (Latest)

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Baker, S.S. #310, #5 M.T.
LeLand-Gifford, S.S., #2 M.T.
Natco, 22-Spindle, #3AL

GRINDERS
Abrasive, 8"x24" Surf. Gr., #34 Vert. Spindle
Arter, 8" Rotary Surface
Bryant, #12 Internal
Cincinnati Valve Seat Grs (#1 Chucking)
Cincinnati, #2 Centerless (Not Filmatic)
Heald, #50 Cylinder Grinder
Heald, #72A5 Plain Extended Bridge, Internal (Latest)
Jones & Lamson, 8"x48" Aut. Th. Gr. (Late)
Landis, 6"x29" Plain Hydraulic Type "A"
Landis, 12"x28" Universal
Lobdell, 30"x160" Roll Grinder, Model #3GH
Landis, 6"x18" Plain Hyd. Type "C" (Late)
Van Norman, #666—20"x48" Crankshaft Re-Grinder, Lathe
Van Norman, #673 Radius Grinder (Latest)

LATHES
Acme Turret, Hollow Hex, 2¾" Hole in Sp., 21" Swing
Gisholt Turret, #2L, 3½" Capacity, T.A.
Gisholt Turret, #3AL, Saddle Type
Gisholt, 6¼" (Tilted) Turret
Oster Turret, Head Throw, 11"—1½" #601
Betts-Bridgeford, 36"x12' B.C., Engine Lathe
Bridgeford, 36"x14' B.C. Grd. Hd. Engine Lathe
Bridgeford, 68"x20' B.C. Engine Lathe
Pond, 42"x8' B.C., Engine Lathe
Prentice, 14"x36" Cone Hd., T.A. Engine Lathe
Denver, 16"x30" Model "A" Threading Lathe
Fay, 20"x37" Auto. Production Lathe (1945)
Lipe, 9"x20" Carbo Production Lathe
Lodge & Shipley, 21"x63"—#3A Duomatic
Seneca Falls, 8"x18" Model "LR", Lo-Swing

MILLS
Brown & Sharpe, #4A Universal
Cincinnati, #0-8 Vertical (Latest)
Cincinnati, Duplex, 45-48
DeVlieg, #31 Production Mill, Table 16"x66"—48" Travel
Hall Planetary, Model "C" Thread Mill (Latest)
Hansom Whitney, Thread Mill, 11" Swing Internal and External Capacity
Kempsmith #33 Simplex, Table 13x14"
Lees-Bradner, 12"x24" Thread Mill, Model HT (Latest)
Brown & Sharpe, Production Mill #12
Nichols Hand Mill
Sundstrand, #4-S RigidMill, 22"x72" Table

PLANERS
Betts, Double Housing, 84"x60"x16' (Late)
Rockford, 36"x36"x10', One Head on cross rail and one head on each side of table

PRESSES
Henry & Wright, 50-Ton Dieing Press, 2" Str. (Latest)
Toledo, 15-Ton, #41 Horning & Wiring Press, 1½" Stroke (Late)
Toledo, 58-Ton, #54 Straight Side, 2½" Stroke

SHAPERS
Gould & Eberhardt, 24" V-Ram with shaper vise, motor drive
Pratt & Whitney, 6" Vert., Max. Str. 6¾" (Latest)

MISCELLANEOUS
Landis Bolt Threader, 4" (Latest)
Allis-Chalmers, 10 KW Induction Heater with Electronic Controls (1946)
Tocco, 50 KW, 2-Station Unit with Starter, 10,000 Cycle (Late)
Fischer Groovers, #1 (Late) and #2 (Latest)
Hazel, #3B, 400# Pneumatic Forging Hammer
Yoder Hammer, 36" Throat, with Pedestal (Latest)
Manville, Header 150 Ton with Magazine Loader, 40-50 Strokes per minute
Williams & White, #13 Punch & Shear, Double End, Throat Depth 36"
Progressive Spot Welder, 75 KVA (Latest)
Bakewell, #1 Tapper
Garvin, #1AT Tapper

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30" BULLARD Vertical Turret Lathe

DRILLS
32" CINCINNATI BICKFORD Upright Drill
ES NATCO Multi. Spindle Drill—Hyd. table, 1942
No. 425 BAKER S.S. Heavy Duty Drill
No. 2MS LELAND GIFFORD 4-spindle Drill

GEAR EQUIPMENT
No. 06 FELLOWS Gear Shaper
No. 725A FELLOWS High Speed Gear Shaper
No. 12 FELLOWS Gear Shaper, 1943
No. 36BM GOULD & EBERHARDT Gear Rougher

LATHES
13"x18" MONARCH "Air Gage Tracer" Mona-Matic Lathe
14"x6' bed HENDEY Mod. ECM, M.D. Eng. Lathe
18"x30" LODGE & SHIPLEY Toolroom Lathe, '41
20"x10' LODGE & SHIPLEY Selective Geared Head Lathe
30"x16' bed AMERICAN "High Duty" Geared Head Lathe.
42"x15' AMERICAN Geared Head Lathe.

GRINDERS
#5 B&S 3"x12" Pl. Grinder
#4H LANDIS 4"x12" Pl. Grinder
6"x18" LANDIS Type C Plain Grinder
8"x18" CINCINNATI Pl. Saddle Type Grinder
6x18" NORTON Vert. Spindle Surface Grinder
10"x18" CINCINNATI Pl. Grinder, '42
10"x22" LANDIS Type C Hyd. Plain Grinder, '42
#104 RIVETT Internal External Grinder
#73 HEALD Internal Centerless Grinders
TG-185 J&L Internal Thread Grinder
#55 HEALD Cylinder Grinder
10"x24" LANDIS Universal Grinder

MILLERS
#2 B&S Pl. Light Type Miller
No. 0-8 CINCINNATI Pl. Miller
No. 0-0 CINCINNATI (07) Vert. Milling Machine
4½"x30" P&W Model C Thread Miller
#1-8 KENT OWENS M.D. Prod. Miller.
Model MMS U.S. Multi-Miller

AUTO. LATHES & TURRETS
No. 3 W&S Ram Type Univ., '42
No. 4D & 6S P&J Auto. Lathes
Nos. 5 JONES & LAMSON Ram Type Univ. Turret Lathe
No. 1MS LIBBY Heavy Duty Turret Lathe
No. 1L GISHOLT Saddle Type Turret Lathe, '43
#2 W&S Geared Friction Head Turret Lathe

MISCELLANEOUS
No. 2 B&S Wire Feed Hand Screw Machine
15" BETTS Vertical Slotter
⅛-B P&W 2-spindle Reaming Machine
4" TAYLOR & FENN Spline Miller
P&W Upright Shaving Machine
24x24x6' GRAY Double Housing Planer
24" CINCINNATI Standard Universal Shaper
38" MORTON Draw Cut Shapers

WIGGLESWORTH INDUSTRIAL CORP.
283 BENT ST. CAMBRIDGE 41, MASS. KIRKLAND 7-5242

McDONALD
USED MACHINERY

Norton 6x18" Horiz. Hand Surf. Grinder 1941
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L and Lucas 8" Bar Horiz. Boring Mills.
30" All Grd. Camel Back Drill 1-Sp. and 4-Sp. Barnes.
Amer. 3' & Morris 3½' Arm Radial Drills.
Blanchard M.D. Vert. Pl. Surf. Grinder 28" chuck.
Campbell No. 215 abrasive cut off 1947.
Beudetroad 4-Sp. Vert. Rigidmill.
Heald #22 Rot. Surf. Grinder 12" chuck 1947.
Dual All Steel Press Brakes 6' & 10' 14-Ga. 1947.
Kilties & Jones 12' Pyramid Roll 4¼" cap.
Baker No. 1 Vert. Keyseater 1½" cap.
Baker No. 1 Vert. Keyseater 1¼" cap.
Sheffield Model 101 Thread Grinder 1945.
Nazel #5-B Vert. Air Hammer A.C. M.D.
Landis 3-Sp. 2" Cap. Bolt Threader M.D.
Headey 10"x5' bed G.C.B. Lathe 1939.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe
G & E 24" Gear Box Shaper Tilt. Table Top.
Newton 48" Table 1-Sp. Cont. Vert. Miller.
Rock River 100 Ton. cap. Horiz. Bulldozer.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Mastermiller M.D.
Heald #70-A Rod Head Sp. Internal Grinder.
Springfield Planer Type Surf. Grinder.
Cochrane-Bly Tool Room Vert. Comb. Miller-Shaper.
P & J #2-M Auto. Prod. Miller, 2 Tables.
Peets-Burt #3B Box. Col. 1-Sp. Hvy. Drill.
L & N. 8', 10' & 12' Press Brakes.
Bullard 24" & 36" Vert. Turret Lathes.
Lynd-Farquhar 26" stroke openside Shaper Planer.

McDONALD MACHINERY CO.
1531-35 No. B'way, St. Louis 6, Mo.

NEW IN STOCK

1—Radil Drill, Rocco 4' x 12" rd. Column 2 motors, coolant, Aux. Table 18 Speeds, 45 to 1100 RPM Morse Taper #4

2—Engine Lathe, 12"x40" centers. Gap.

1—Engine Lathe, 16"x60" centers, Taper attach. Gap.

1—Bench Radial Drill, Zewo, 21"x1½" Cap.

(Photos on request)

KINGS COUNTY MACHINERY EXCHANGE
408 Atlantic Ave. Brooklyn 17, N.Y.
Dept. A — TRiangle 5-5237

UNIVERSAL TOOL & CUTTER GRINDER

Vernon Late Model. Motorized Headstock. Table 28" x 5½". Swing 10". Head Swivel 360°. Table Swivel 90°. Complete with 2 motors, 3 jaw & 4 jaw chucks, Internal Grinding also Dresser Attachment. Serial 7072. Good condition. Priced to sell.

BOICE-CRANE CO.
930 Central, Toledo 6, Ohio

8-SPINDLE KINGSBURY DRILLING MACHINE; TWO #30, TWO #18 VERTICAL HEADS; FOUR #18 HORIZONTAL HEADS; 30" ROTARY TABLE; COOLANT; A.C. ELECTRICS.

BARRON MACHINERY CO.
111 S. Clinton St., Chicago 6, Ill.

FOR IMMEDIATE SHIPMENT

1—Fifield Engine Lathe—61" swing x 72" center, quick change $7,500.00
1—Colbourne Vertical Boring Mill—48" swing $10,000.00
1—Gray Planer—36"x36"x16 ft. $4,800.00

All machines can be seen under power.

MITCHELL MACHINE CO.
1538 18th St., Detroit 16, Mich.
Tel: TAshmoo 6-4555

IMMEDIATE DELIVERY
MACHINE TOOLING
FOR ALL STANDARD MACHINES
Our Ten Million Dollar Tool Crib serves Big and Little plants all over the nation. Everything Guaranteed!
We Buy *Mfg. Plants*
Machine Shops,
Big Tooling
Inventories

U.S. INDUSTRIAL TOOLS
416 So. Central Ave., Los Angeles, Cal.

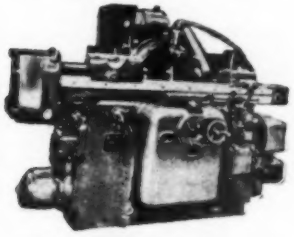
NEW and LATEST TYPE REBUILT MACHINE TOOLS FOR SALE or LEASE

LAPPING MACHINES

ULTRALAP Model 10 Vert. Lapper

LATHES

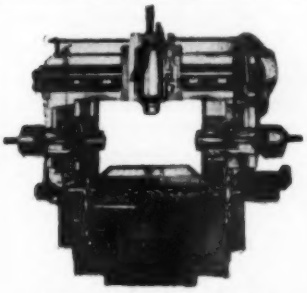
SOUTH BEND 10"x4' Q.C.G. Engine Lathe 1" Cap.
MONARCH Model EE 10"x20" Toolroom
NEW LOGAN 11"x30" CC 1" Cap.
MONARCH Model N G.H. Engine Lathe 33½"x120" cc
LODGE & SHIPLEY G.H. Engine Lathe 24"-27"x16' cc
AMERICAN G.H. Engine Lathe 24"-27"x90" cc
AXELSON G.H. 24-Sp. Engine Lathe 16"x54" cc
LEHMANN G.H. 10-Sp. Engine Lathe 18"-20"x82" cc
AMERICAN G.H. Engine Lathe 18"-19½"x30" cc
MONARCH Model 5T Multi-Tool Mfg. Lathe 12"x16" cc
HARDINGE 2nd Operation Lathe 1" Cap.
CARROLL-JAMIESON 16"x8' G.H. 12-Speed Lathe



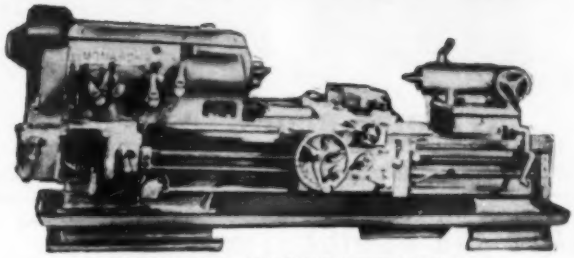
JONES & LAMSON MODEL TG 12 x 45"
AUTOMATIC THREAD GRINDER

TURRET LATHES

WARNER & SWASEY Mod. 2 G.H. Ram Type 1" Cap.
WARNER & SWASEY Mod 2 G.H. Ram Type 1½" Cap.
BARDONS & OLIVER Mod 2 G.H. Ram Type 1" Cap.
BARDONS & OLIVER Mod 3 G.H. Ram Type 1½" Cap.
WARNER & SWASEY Mod 3 G.H. Ram Type 1½ Cap.
GISHOLT Mod 3 G.H. Ram Type 1½" Cap.
LIBBY Mod 4R G.H. Ram Type 2" Cap.
BARDONS & OLIVER Mod 5 G.H. Ram Type 2" Cap.
WARNER & SWASEY Mod 5 G.H. Ram Type 2½" Cap.
GISHOLT Mod 5 G.H. Ram Type 2½" Cap.
FOSTER Mod 1B Univ. G.H. Saddle Type 2-9 I/10" Cap.



P&W 40" VERTICAL MILLER AND
PROFILER—WITH TWO SIDE HEADS



MONARCH 33½" x 120" ENGINE LATHE—MODEL N

AUTOMATICS

BROWN & SHARPE Model 00G ⅜" Cap.
CLEVELAND Model A Single Spindle 9/16" Cap.
CLEVELAND Model A Single Spindle 1-1/16" Cap.
CLEVELAND Model A 1¼" Cap.
CLEVELAND Model B Single Spindle 1½"—1⅝" Cap.

BORE-MATICS

EXCELLO Model 2112A Single End Double Spindle Hyd. Cross Slide Table
HEALD Model 48A

DRILLS

NEW O. M. S. R. Type T.B. 2 Radial 4'x12" Column
NEW ZEWO Universal Floor Type Radial 21"x½"
NEW CANEDY OTTO 15" Single Spindle ⅞" Cap.
NEW FAMCO 15" Bench Type Drill Presses ½" Cap.
NEW FAMCO 15" Floor Type Drill Presses ½" Cap.
MORRIS MOR-SPEED RADIAL 3'x9" Column
LELAND GIFFORD 2 Spindle

GEAR EQUIPMENT

BARBER-COLMAN Type 8 Hobber
FELLOWS 3" Fine Pitch Shaper
GLEASON 12" Straight Bevel Generator—Finisher—Rougher
GLEASON 3" Straight Bevel Generator
GLEASON 3" Spiral Bevel Gear Generator
GLEASON 3" Bevel Gear Tester
GLEASON Model 6 Angular Hypoid Tester
GLEASON 10" Spiral Bevel Generator
BARBER-COLMAN Model 12 Hobber 12" Cap.
BARBER-COLMAN No. 3 Precision Hobber

GRINDERS

BROWN & SHARPE Model 2 Internal-External Universal Grinder 14"x30" Cap.
CINCINNATI Univ. Hydr. Cyl. Int.-Ext. Grinder 12"x 36" Cap.
NORTON Model C Hydr. Plain Cyl. Grinder 6"x30" Cap.
THOMPSON Model F Hydr. Surface Grinder 6"x18" Cap.
ROTOREX Model 101-A Universal T & C Grinder, w Int. Att.
COVEL Model 01A Univ. T & C Grinder
JONES & LAMSON Model TG-12x45" Auto. Thread Grinder
EXCELLO Model 25 Thread Grinder
EXCELLO Model 51 Thread Grinder

MILLING MACHINES (Horizontal)

VAN NORMAN Model 36 Ram Type Duplex
VAN NORMAN Model 22L Ram Type Duplex
NEW CENTEC Model 2A Universal With Vert. Att.
BROWN & SHARPE Model 3B Heavy Plain
MILWAUKEE Mod 3B Plain
MILWAUKEE No. 1-B Universal Miller
SUNDSTRAND Rigidmil Bed Type Production
BROWN & SHARPE Mod 10 Auto. Production Miller
CINCINNATI Mod 00 Plain Horiz. Auto., Cycle

MILLING MACHINES (Thread)

PRATT & WHITNEY Model C-M-1006 Thread Miller 4½"x30"
HANSON & WHITNEY Univ. Semi-Auto. Thread Miller 10"x48"

MISCELLANEOUS

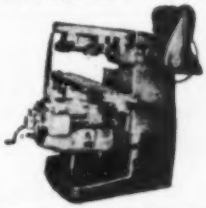
FAMCO #6, 8, 10, 12, 15 Foot Presses (NEW)
EXCELSIOR #6, 8, 10, 12, 15 Foot Presses (NEW)
ARBOR PRESSES (NEW)

VERTICAL MILLERS AND JIG BORERS

KNIGHT Model 3B Univ. Vert. Miller
MILWAUKEE Model 3 Vertical Miller
BROWN & SHARPE Model 2 Vertical Light Type Miller
GORTON Model 8D Super Speed Vertical Miller
CLEVELAND Model 1 Vertical Miller

PRESSES

WIEDEMANN Model R11P 18 Sta. Power Turret Punch
RUESCH #2 Percussion Press



NO. 36 VAN NORMAN MILLING MACHINES

PROFILERS

PRATT & WHITNEY 40-Inch Profiler 2 Side Heads
PRATT & WHITNEY 30" Single Spindle

SAWS

PEERLESS Universal Hack Saw 6"x6"
NEW FAMCO Model 612 Horiz. Band Saws 6"x12"

SHAPERS

HENDEY Universal H.S. Crank Shaper 12"
GOULD & EBERHARDT Industrial Shaper 20"

SHEARS

COLUMBIA 90"x¼" Cap. 18" Gap Power Shear

TAPPING MACHINES

BAKEWELL Model 2 Tapper ⅝"—2½" Cap.

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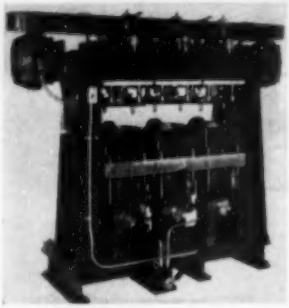
PHONE: WORTH 4-7615



AUTOMATIC 3-STATION DRILLING MACHINE FOR SALE

Vertical 3-station drilling machine with three independent motor-driven heads. Work tables raised and lowered by three independently operated Logan hydraulic cylinders. Fixtures automatically indexed 60 degrees with each drilling cycle. Welded steel base and frame. Complete with three 3-hp., 220V, 3-phase, 60-cycle motors and coolant supply system. Write for details.

PITTSBURGH-ERIE SAW CORP.
4025 LIBERTY AVE. PITTSBURGH 24, PA.

BROWN & SHARPE Automatics (several)
#12 Martin Hydraulic Marking Machine
#3 LODGE & SHIPLEY Duomatic Lathe
BAIRD Cut & Carry Drawing Press
4" RICE BARTON SPLINE MILLER
20" HENDEY Heavy Duty Shaper
400 & 500 lb. Standard Automatic Drop Hammers
DIAL FEED POWER PRESSES
SHELL THREAD ROLLERS
#10 W.F.F. Thread Rollers
36" ESPEN-LUCAS Hydraulic Cold Saw
Numerous Other Machine Tools

CURRIER MACHINE SALES
1055 State Street, P. O. Box 1503
New Haven, Conn.

Will Sell or Exchange

For tool and cutter grinding equipment: Blake #2 Tap Chamfer Grinder with accessories. Condition like new.

SERGE SIDNEY
62 Kingswood Road, West Hartford 7, Conn.

LATE and CHOICE

MILLS

No. 5 CINC. Pl. Horiz., Rect. Overarm
No 3 CINC. Dial Type Pl. Horiz. (1939)
No. 22L VAN NOR. Ram Type, Many Ex. '41
No. 0 VERNON Vert. and Horiz. (1942)
No. 2 SAIMP Univ., NEW, div. head

TURRET & ENGINE LATHES

No. 3A WARNER & S. Univ. Bar Fd. & Chuck
No. 3 B. O. Univ. Air Chuck & Collet (1940)
No. 2 B. & S. Wire Fd. Hand Screw Mach. '42
No. 2 DIEHL Tur., Air Chuck, P.F. to Tur. '42
16"x42" LEBLOND Rap. Production, Timk. '38
25", 28"x96" cc L. & S. Heavy Duty Engine
9" to 60" ENGINE LATHES, Older Type

GRINDERS

6"x18" NORTON Surface, Hand Feed (1942)
25A HEALD 24" Rotary Chuck, Like New '41
14"x36" P. & W. Vert. Surf., 12"x30" Chuck
10"x36" HILL CLARK Pl. Cylindrical (1943)
No. 2 UNIV. Tool & Cutter, Many Att. (1940)
10" P. & W. Dble. Head Gear Grinder (1942)
No. 2 CINN. Centerless, Model B. & H.

DRILLS

5201 BARNES Box Column Hvy. Duty (1941)
No. 2 BUFFALO Box. Col., No. 3 M.T., P.F. Motor Spindle. (1943)
No. 2 ALLEN Mtr. Spdl., 1 on 3 Spdl. Base. '43
No. 1LMS LE. & GI. High Spd. to 9000 rpm.
2 Spdle. AVEY No. 3 M.T. Tapping Att. Excel.

SAWS

9"x9" and 8"x8" PEERLESS Univ. Hack (After 1941)
36" YATES Hvy. Dty. Band, 10 h.p. Mtr. '43
New 6"x6" TOLEDO Hack

MISCELLANEOUS

Press Brake: 10' 10 ga. C.B. STURDYBEND. ER (1946)
Gear Checker: 12" RED RING Universal. '42
Gear Shapers: (2) FELLOWS No. 61 4 Spd. Mtr.
Automatic Chucker: 4 Spdl. CLEVELAND 8"
Vertical Shaper & Slotter: 6" P. & W.
Planer: 24"x24"x6' LIBERTY, Box Table
Shaper Planer: ROCKFORD Openside

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MDNA MEMBER

Robert W. Rice and Company, Inc.

210 So. Clinton Chicago 6, Ill.
Financial 6-0782
Directly Across from Chicago's Union Station

BROACHES—Late Type

Colonial Vertical Surface 10 ton 66"
Colonial Vertical Surface 12 ton 60"
Colonial Vertical Pull Down 15 ton 48"
Colonial Horizontal Universal 10 ton 60"
American Vertical Pull Up 35 ton 42"

MISCELLANEOUS

Sleeper & Hartley #5 Universal Coiler
#3 Baird 4-Slide Forming Machine
Lester 6 oz. Injection Molding Machine

AMCO
MACHINERY COMPANY
125 Leib St. Detroit 7, Mich.

Westinghouse Electric Hardening Furnace, pusher type, for 16" breech blocks. Range 0 degrees to 1800 degrees.

W. C. COWDEN MACHINERY CO.
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MACHINERY FOR SALE
ATTENTION EXPORTERS

Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12" Gleason Generators, 36 BM Gould & Eberhardt Roughor, #7 Fellows Gear Shaper, #16 D. E. Whiton Machine. Write for full information.

FS-1853, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

"Schuler" Automatic 10-station Transfer Press, new and unused. Full details from Works Manager,

ALADDIN INDUSTRIES, LTD.
GREENFORD, MIDDX. ENGLAND

SCREW MACHINES
For Sale or Rent

Latest type modern machines, up to and including 2½" dia.

Phone Buffalo, N. Y. — Lincoln 7076

FILTERS FOR OIL CLARIFICATION

20—Sperry 18"x18" Filter Presses, plate and frame, closed delivery, 11 chambers, ½". Can supply Viking Rotary Pump 1½ H.P. geared explosion proof AC motor with each.

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Classified Advertising Division

American Machinist
330 W. 42nd St. New York 36, N.Y.

SOME LATE MACHINES STILL AVAILABLE

BORING MILLS

Bullard 24" V.T.L., Spiral Drive
Cleveland 3½" Bar Cap.
Giddings & Lewis No. 32, 3" cap.
King 42", 72" Vert. 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
Niles-Bement-Pond 60" Vert.
New 3" Hor. Bor. Mills

DRILLS AND RADIALS

American 6'x15" Univ.
Bausch Multi-spindle
Buffalo #2 Motor Spindle
Canedy-Otto 21" Sliding head New
Cincinnati Bickford 6'x15" col.
Natco #12 20 spindle drill, Bausch
24" Sibley Sliding head
New Geared Box Col. Drills 24'
Foote-Burt #25 3" cap.
Leland Gifford 2 LMS 3 MS

ENGRAVERS

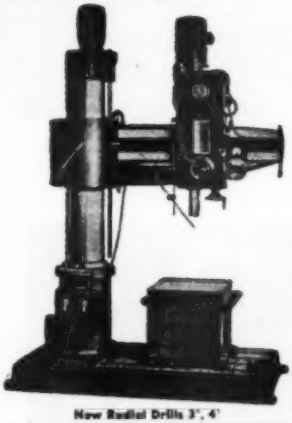
Deckel type 3 Dim., New
Garton 3S Die Sinker
Garton #1A, ML, Deckel GIL
Taylor-Hobson 3 dim.

GEAR EQUIPMENT

Barber-Colman #2, #12 (3), Flather 72" Cutter
Fellows High Speed Shapers 712, 725, 71
Fellows #20M Redliner
Flather 72" Cutter
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter
Michigan Gear Finisher 24" cap., 862-24-A
National Broach Red Ring Lapper
Schuchardt & Shutte #1 Hobber

GRINDERS, MISCELLANEOUS

Bryant #5, Internal, chucking, 16A16
Cincinnati 6x18" Cyl. Hyd.
Heald #73 Internal Centerless, Sizematic
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic
Landis 6"x30" Type C Cyl., 10x24 Univ.
Majestic Internal, Grandy
Norton Type C 6"x18" Semi-Automatic cyl.
Norton 6"x30", 10"x18" Type C cyl.



New Radial Drills 3', 4'

NEW IN STOCK

Air Hydraulic Presses — Arbor Presses 56C Famco — Band Saws Kalamazoo — Famco 6x12"—Drill Presses all sizes—Hydraulic Press Northern 20 Ton — Injection Molders, 1 ounce — Power Presses, OBI, 1, 4, 4½, 5, 7½, 10, 15, 20, 30, 55, 85 ton—Shaper 7" Amco, 8" Shaperite — Shears, Foot 22" to 8', 16 & 18 ga.—Shears, Power 3'x18 gauge to 10' x 10 ga.—Welders, Arc, Seam, Spot all sizes Motors, Grinders, Buffers.

150 Ton H.P.M. Triple Action Press 50 ton cushion, 50 ton blankholder, bed 36" x 36".

Norton 14"x96" cyl., 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer
Sellers 6T Tool, K.O. Lee Tool
Van Norman #666 Crankshaft
Wicaco Internal

GRINDERS, SURFACE

New 8x24" Hyd. Feed, 10x18"
Abrasive 8x24", #33 Vert. & #34
Blanchard #16, 26" Mag. Chuck
Heald 22—12" chuck After 12"
Norton 6x18" Hyd., 10x36" Hydr.
Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vert.
Reid 11x36 Motor in Base
Taft Pierce #1 Precision

LATHES

American 14"x30
Bridgeford 36"x20', 32"x16'
Hendey 12"x42" and 12x30", 1941, 16x66"
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed, 19x42"
Lipe-Carbo 12"x18" (2)
Lodge, P. & W. 16"x60
Lodge & Shipley #3A, #3 Duomatics
Sebastian 12"x4' G.H., Sheldon 12"
Wickes 32"x35' Geared Head
Reid Small Piece #9WSL
Sundstrand 8x15", 15" Stub
Rivett Model 918 Precision
New 16, 18, 20", 28" Immediate Del

MILLS, PLAIN, UNIV. PROD.

Brand New Universal Mills No. 1, No. 2
Archdale Plain, 14", Prod.
Brown & Sharpe #3B Plain, Late, 3A, 21, #2L
Cinn. No. 3, 4 Plain Spd
Kent Owens 1V, 1-8 1-14, 1M
Kempsmith #1 Pl.,Vert. & Div. Hd.
Milwaukee 2K, 2H Univ., 2H Plain
Milwaukee #2B, Plain & Univ.
Simmons Micro-Mill #1A
Sundstrand #00, 0, Rigidmills
Sundstrand #3A Rigidmill with copying Attach, 33
Van Norman #2L Univ.

MILLS, VERTICAL

Brand New Vertical Mills
Cincinnati #3, #4 hi-power
Cincinnati 08 Vertical
Morey #12M Profiler, 2 sp.
Pratt & Whitney Profiler 12B, 2 sp.
Reed Prentice 3V

PRESSES

Bliss 645, 650 Hi-Production Presses
Bliss 18, 21, OBI, 58, 62, 162, OB
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton 55, Bliss 74½
Hamilton 850 Ton S.S. Bed 27'x48
Hamilton 110 PM Die Tryout Press
Bliss 5-48 Dbl. 32x48" bed, Cushion
Toledo 92½c Dbl. Crank 43x23" bed.
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Herring, 15 Ton
Niagara A1½, O.B.I.
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, LJ #3

TURRET LATHES

Acme 6W Fox 2-9/16" Cap. #2 Cross Slid. Turret
Bardons & Oliver #2, 3, 5, 7
Brown & Sharpe, #2 Hand, #10, 11
Denver 6 2" Shell Turret (2)
Foster #28 2½" Cap. Morey #3G Late
Gisholt 2L, Cross Slid. Tur. #5 Bar Feed, Chuck
Gisholt Simplimatic
Jones & Lamson #5, Bar Feed
Morey #2G Late
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1A, Timken Head
Warner & Swasey #1, 2, 3, #4 Proselector

MISCELLANEOUS

Automatic; New Britain 61 6 Sp. 1⅜" Late
Automatic, Cleveland Model B 1-1/16", A
Automatic 0 & 5 #00G 0G, 2G
Automatic 4 Sp. 1½ Conometic
Band Saw: DoAll Zephyr 36", 16" Metalmaster
Bolt & Pipe Threader: Landis, Oster-Williams #915 Pipe & Nipple Threader
Broach: 3L LaPointe Hydro. Horiz. New Klink. 6 Ton
Hacksaw: Peerless 6"x6"
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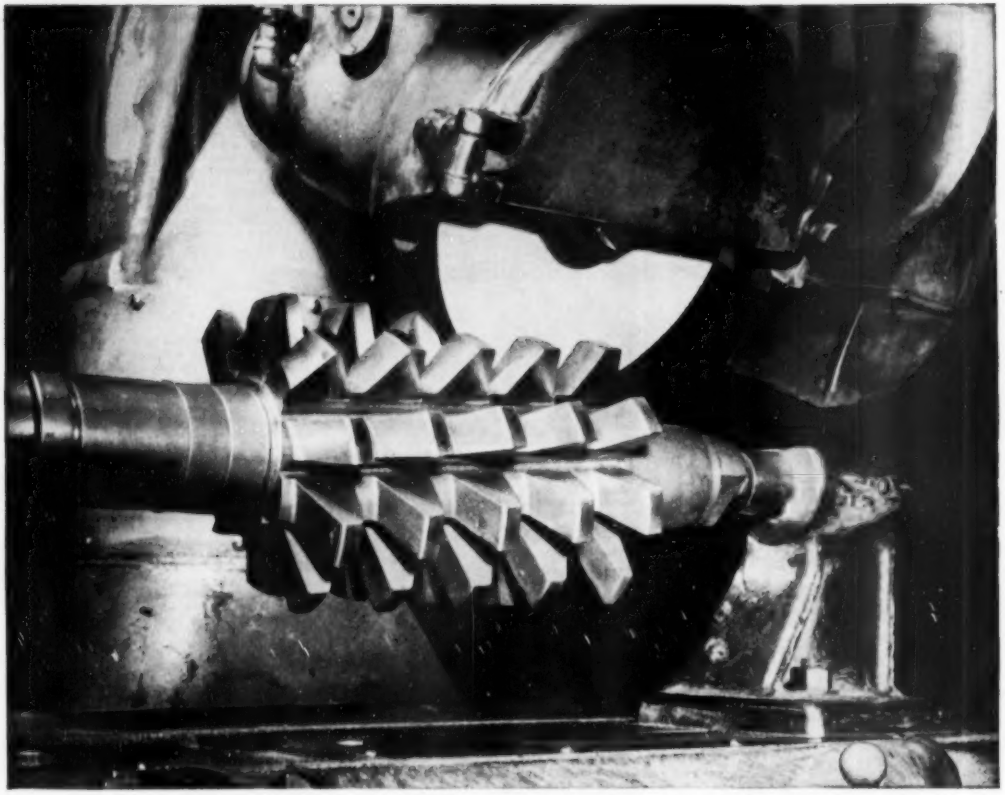

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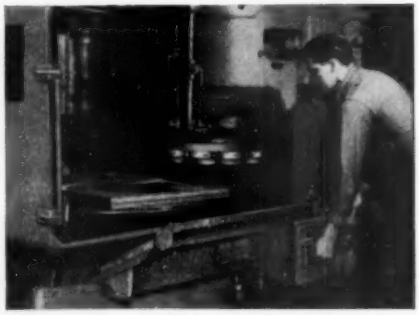

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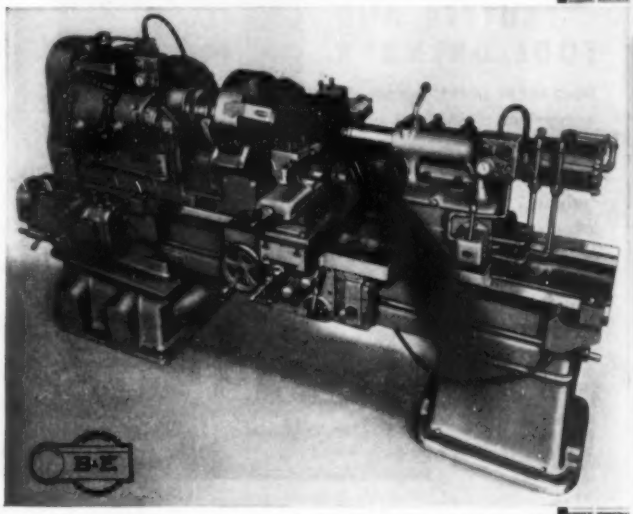

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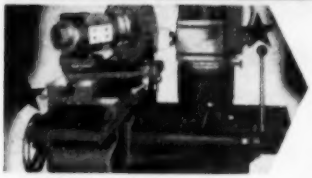

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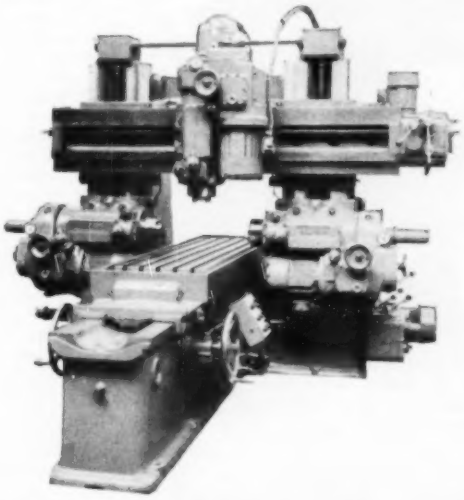

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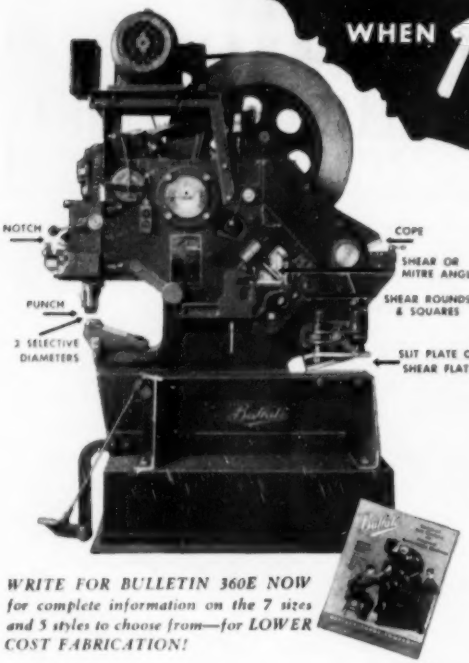

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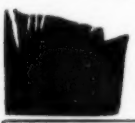

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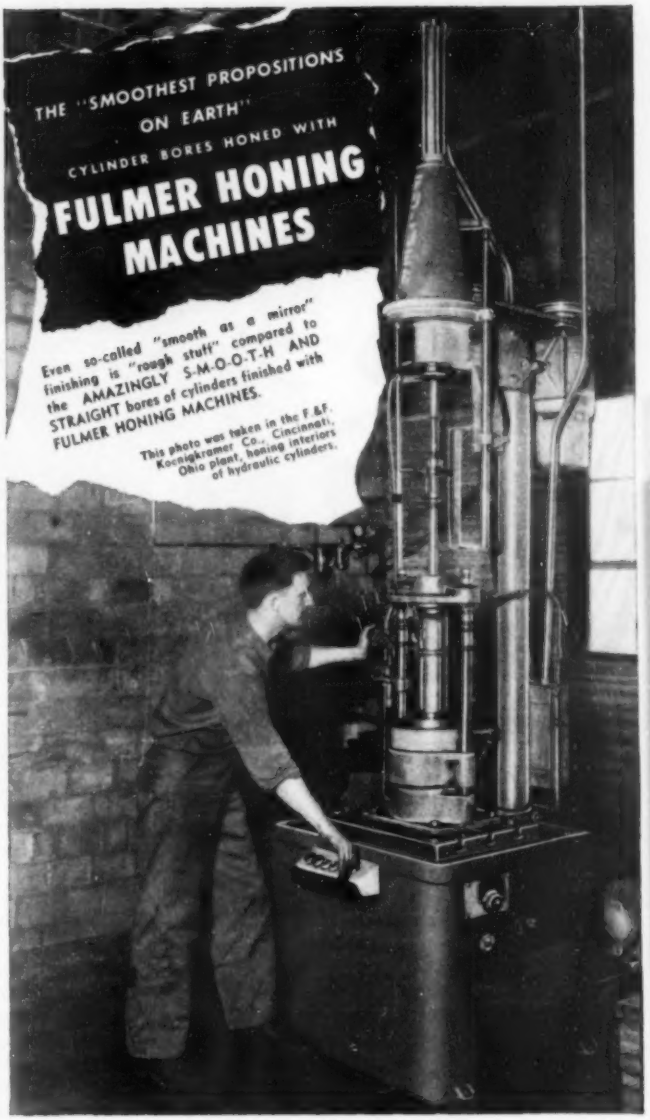

THE "SMOOTHEST PROPOSITIONS ON EARTH"
CYLINDER BORES HONED WITH
FULMER HONING MACHINES
Even so-called "smooth as a mirror" finishing is "rough stuff" compared to the AMAZINGLY S-M-O-O-T-H AND STRAIGHT bores of cylinders finished with FULMER HONING MACHINES.
This photo was taken in the F & F Koenigkramer Co., Cincinnati, Ohio plant, honing interiors of hydraulic cylinders.

Tolerances as close as .0001 (±). 15 sizes available for diameters from ¼" to 30" and strokes from 12" to 84". For ferrous and non-ferrous metals, glass, plastic, etc.

WRITE FOR YOUR PERSONAL COPY: "WHAT TO KNOW ABOUT HONING"

105 EAST FOURTH ST. **CINCINNATI 2, O.**

C. ALLEN FULMER CO.

"You may have to stand outside!"

REMEMBER Aesop's fable of the camel and his master--how the kind master allowed the shivering beast to put into the tent first his head, next his shoulders, then his forelegs!

And then the camel said, "Master, I think I ought to come wholly inside," and crowded in. Immediately he said, "There is hardly room for us both, so I think it would be better for you to stand outside so I can turn around and lie down." And without further ado, the camel kicked the man out and took the entire tent.

Men have heard this story for 2,500 years--repeatedly have seen how it illustrates what happens when one man or group of men gain power over others. Men saw it happen in Italy and Germany when Mussolini and Hitler took over. Men saw it happen in Russia.

Even here in America a similar trend is evident. Powerful influences overlook no opportunity, through political manipulation, central controls and bureaucratic regulations, to intrude more and more in our private lives. The situation demands continual, alert watchfulness by all citizens who believe in individual liberty and freedom, to prevent this camel of big government from creeping further into the tent. Before we realize it, "we, the people," the master, may find ourselves "standing outside." In America it is government, which is the servant of the people.

YOUR SCRAP IS NEEDED — YOUNGSTOWN

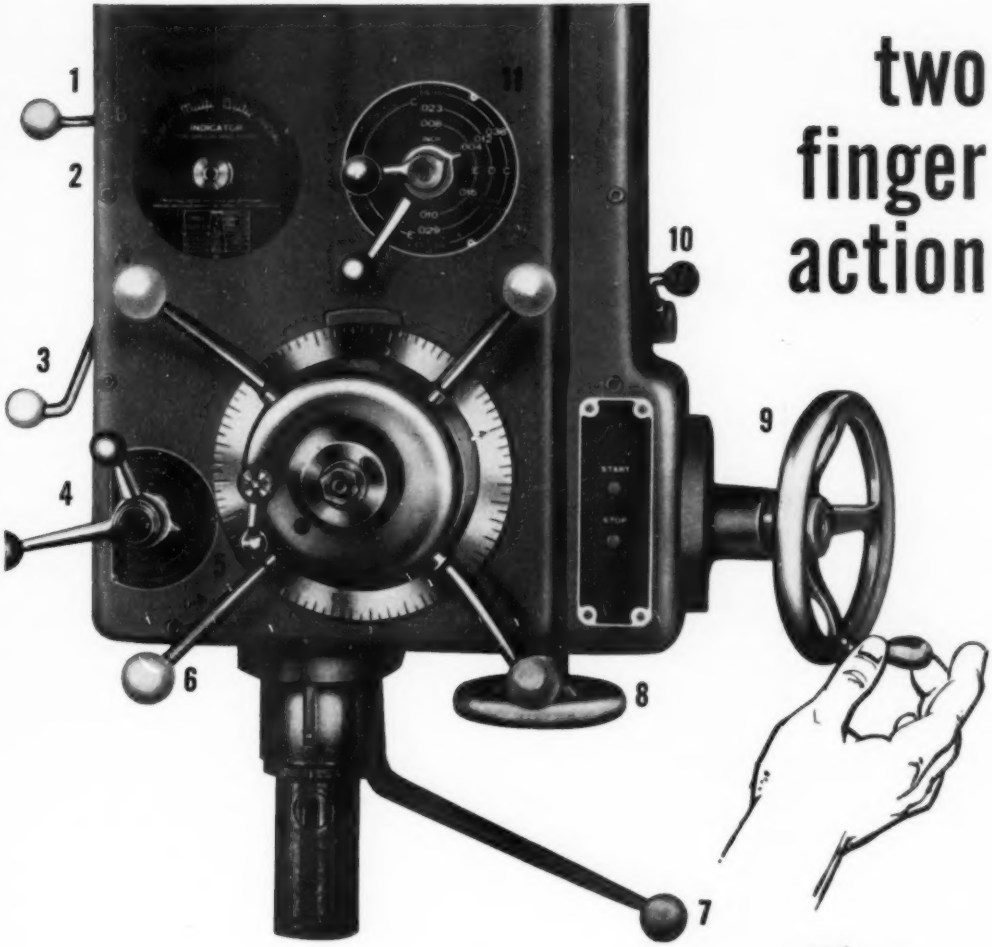
The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York

MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

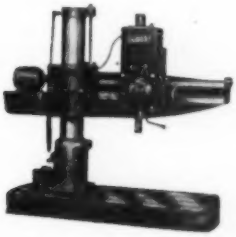
The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment

two finger action



Any Gilbert radial operator will tell you that the smooth, easy response of controls saves time, cuts down fatigue, and helps boost output. Furthermore, the operator has good visibility of the work **without** raising the head above a comfortable working height, because the spindle axis is close to the front face of the head.

Note clean, compact grouping of controls: (1) speed back gear, (2) speed and feed indicator, (3) head clamp lever, (4) speed change levers control 12 speeds; direct reading plate simplifies selection. (5) adjustable depth stop clamp, (6) spindle power feed is engaged by pulling any turnstile lever, (7) spindle reverse lever, (8) fine feed hand wheel, (9) head traverse hand wheel, (10) power feed engaging lever, (11) feed change levers provide six feeds (twelve with tap heads) shown on direct reading plate.



Ask your Gilbert representative for a demonstration, or write for Bulletin 349

THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY
3366 BEEKMAN ST. • CINCINNATI 23, OHIO

THOSE WHO BUY GILBERT BUY GILBERT AGAIN

Make these hard parts better with 52100 steel

1. Diesel injection pumps
2. Lathe centers
3. Slitting rolls and knives
4. Cam rollers for automotive steering gears
5. Machine tool parts
6. Pump parts
7. Aircraft engine parts
8. Mechanical seals
9. Saw mill rollers
10. Ball bearings
11. Asbestos disintegrators
12. Mill rolls

Because it's hard and tough—yet easy to machine—52100 steel is ideal for the parts you see listed above. 52100 was originally developed for ball bearings. It is now used for a wide variety of machined parts where exceptional strength and wear resistance are required.

52100 is a high carbon chrome alloy steel with high tensile strength and high fatigue strength. Because of its fully spheroidized structure, it machines easily. 52100 steel produced by the Timken Company will withstand a working pressure of 200,000 p.s.i. and can be oil quenched to a maximum hardness of 65/66 Rockwell C.

The Timken Company is one of the world's largest producers of 52100. And no other company offers 52100 in *all three* finished forms — bars, tubes and wire. To meet your small run or emergency needs, the Timken Company maintains a mill stock of 101 sizes of 52100 tubing—from 1" to 10½" O.D. And because the Timken Company controls quality rigidly at every step of production, you're assured of uniform quality in every shipment.

For a stock list of available sizes, grades and finishes, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING